Southern Flight

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September, 1942

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"The Army and Navy are conferring upon the Hamilton Standard Propellers Division the Army-Navy Production Award for high achievement in the production of war equipment.

"This award symbolizes your country's appreciation of the achievement of every man and woman in the Hamilton Standard Propellers Division of the United Aircraft Corporation . . . *and is* . . . accorded only to those organizations which have shown exceptional performance in fulfilling their tasks.

"I am confident that your outstanding record will bring victory nearer by inspiring others to similar high achievement."*

*from official notification of award.

HAMILTON STANDARD PROPELLERS
EAST HARTFORD, CONNECTICUT
ONE OF THE THREE DIVISIONS OF UNITED AIRCRAFT CORPORATION

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SEP 19 1942

To the armed forces

The entire personnel of the Sperry Gyroscope Company is deeply honored in being among the first to receive the joint Army-Navy Production Award *for high achievement in the production of war equipment.*

We at Sperry are determined to see the job through. This recognition from our armed forces will be a continuing source of inspiration to us.

SPERRY GYROSCOPE COMPANY, INC.

BROOKLYN, NEW YORK

SAFEGUARD *to the present...*
GATEWAY *to the future*

The time-vault, with its flawless mechanism, protects man's most valued material possessions. So also America's powerful precision-built aircraft engines are today safeguarding the values that will make the future secure. As the gateway to tomorrow opens, we see the tonnage loads of commerce going by air—world progress for which Wright provides the power.

WRIGHT *Aircraft Engines*

POWER THE TONNAGE OF THE AIR

Southern Flight

The only complete monthly digest of aeronautics in the South and Southwest

SEPTEMBER, 1942 VOL. XVIII, NO. 3

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Published Monthly by

AIR REVIEW PUBLISHING CORPORATION

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BUSINESS STAFF: R. T. Gidley, Conard Baker, Jr.

FIELD REPRESENTATIVE: Tony Hagmann.

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REVVING UP

SOMETHING NEW HAS BEEN ADDED—Beginning on page 31 of this issue, SOUTHERN FLIGHT inaugurates a valuable service to Civil Air Patrol members by publishing codified training and operations directives, conveniently marked and punched for insertion in looseleaf CAP Handbooks which are available to CAP members. How to obtain the Handbook will be found on page 58. Additional handbook fillers will be published in future issues of SOUTHERN FLIGHT.

★ ★ ★

GET THERE FIRST—Ray Daniell, our engraver, turned up the other day with some corporal stripes and a pocket full of application blanks, assuring everyone a spot of action "without delay" in the Marine Corps. "We got aviation and we're a'fixin' to use it," said Daniell. "Join the Marines—stop griping and start grabbing."

★ ★ ★

STRIKE UP THE BAND—War or no war, the cowhands down our way have got to have music. And we don't mean any clap-clap-clap-clap stuff, either. Or zoot suit jive. We mean something dreamy, with heart aches and misty melancholy. The newest ditty of the range has these and more—airplanes! It was written by James R. O'Daniel and Tommie Haas, a couple of Fort Worth cowhands who dedicated it to dear old SF. So you'll know it on sight, we're reproducing the title page below, and here are the words:

I'm sailing along in my dreamplane,
I'm cruising back home to you.
Through a misty airlane, or skies that are blue,
I'm drifting to you and to dreamland,
You're waiting for me at the dreamport,
I'm off on my Southern Flight,
Through sunshine or darkness or moonlight,
I'm sailing my dreamplane to you.

SOUTHERN FLIGHT, September, 1942. Vol. 18, No. 3. Published monthly. Publication office, P. O. Box 750 (1901 McKinney Ave.), Dallas, Texas. Price 25c single copy. Subscription rates: United States and possessions and Latin-American countries: One year, $2.00; two years, $3.00. Canada, $2.50 a year. Other foreign countries, $3.00 a year. Established February, 1934. Entered as second-class matter at the Post Office, Dallas, Texas, under act of March 3, 1879.

Copyright, 1942, by Air Review Publishing Corporation.

WHEN THE "Big Boy" LANDS—

★ When the world's largest bomber, the eighty-two ton B-19, returns to the ground the force of the impact is terrific. Yet this mighty leviathan of the skies lands with effortless ease because the shock is absorbed by Aerols.*

It is indeed fitting that the B-19 is equipped with Aerols. For they are overwhelmingly preferred by the aviation industry; more Aerols have been used on planes than any other kind of shock absorbing device. Furthermore, they were the *first* units to cushion landing shocks by hydraulic-pneumatic action. This principle of operation has proved so successful that is has been almost universally adopted.

Today, the engineers who pioneered and perfected Aerols are busier than ever, designing units for the warplanes of the United Nations. Tomorrow, Aerols will render an equally vital service when the skyway again becomes a great pathway of peace.

THE CLEVELAND PNEUMATIC TOOL CO.
AIRCRAFT DIVISION • **CLEVELAND, OHIO**

Also Manufacturers of Cleco pneumatic tools for the aircraft and general industry, Cleco sheetholders, Cle-Air shock absorbers for trucks and buses, and rock drills for mining and construction work.

AEROLS*

* THE SHOCK ABSORBING UNITS ON AN AIRPLANE'S LANDING GEAR. THE NAME IS DERIVED FROM THE WORDS "AIR" AND "OIL"—THE FLUIDS USED TO DISSIPATE THE LANDING SHOCKS.

for . . . Today's

LIFELINES

Tomorrow's

AIRLINES

TO MARTIN WORKERS who built her, the Navy's giant flying boat "Mars" is "just another airplane." But to a nation suddenly awake to the vital need of air transport, she is our brightest hope for frustrating enemy submarines and speeding war materials to distant battle fronts.

Today the "Mars" looms large in eyes that see millions of tons of shipping sinking beneath the waves . . . see plodding surface vessels taking months to reach fronts that may shift overnight . . . see Allied forces hampered, imperiled, by lack of supplies.

Fleets of Mars-type ships can assume much of the burden now moving so hazardously via surface craft. Indeed, only 343 of them can do the job of a 25-ship convoy and require far less raw material to build. In addition, up to a score of naval escort vessels would be freed for other duties.

Hard-won experience, gleaned from construction of the Martin Clippers . . . the Russian Clipper . . . and the Navy's patrol bombers, is embodied in the Martin "Mars". Out of this experience, Martin is opening new vistas not only for today's lifelines, but for tomorrow's airlines.

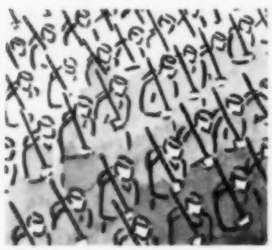
Martin
AIRCRAFT

Builders of 'Dependable Aircraft Since 1909

Big? . . . You bet the Martin "Mars" is big! But Martin has flying ships nearly twice her size all ready to build when the needs of war or peace demand it. There are giants in these days, too!

BIG? . . . the Martin Mars can easily fly to Europe and back, non-stop, carrying an 11-man crew and tons of payload or arms and munitions.

BIG? . . . the 16,665 cubic feet contained in the hull of the Mars are equivalent to the content of a 14 to 16 room house.

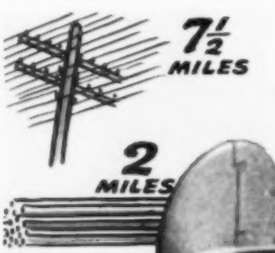


BIG? . . . 150 soldiers in full equipment can be transported by the Mars . . or an equivalent weight in supplies.

BIG? . . . the strength of 8000 horses, in four mighty motors, powers this great cargo ship.

BIG? . . . when completely fueled for flight, the Mars holds a tank-car full of gasoline.

BIG? . . . 24 feet from top of hull to bottom, the Mars contains two full decks.

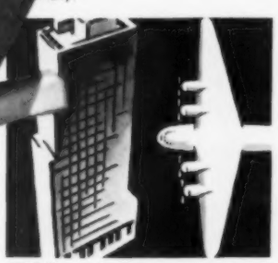


BIG? . . . veins ar… "Mars" consists of 2 mi… conduits, 7½ miles of w…

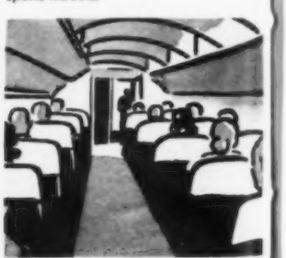
BIG? . …fficers, …rivate …ower- …than

…phones connect the …motors run …ators, supplying …ricity.

BIG? . . . from actual photograph, demonstrating size and strength of "Mars." Planes on wings are standard sports models.



BIG? . . . if the Mars were balanced on one wing, the other would reach to the top of a 20-story building.



BIG? . . . the bridge, or flight deck, of the Mars is larger than the entire interior of a 21-passenger airliner.

E.L.I. is helping speed them

INTO THE AIR

E L. I. has always built precision equipment, with many of our instruments adopted through World-Wide use, as standard for the production and conservation of Petroleum. Today our resources of equipment and skill are achieving remarkable production records in the manufacture of aviation products to help the United Nations finish the job!

RUDDER CONTROL TAB BRACKET

ELEVATOR TAB CONTROL

Engineering Laboratories, Inc.

CONSULTING ENGINEERS AND MANUFACTURERS

TULSA, OKLAHOMA, U. S A.

EQUIPMENT IN WORLD-WIDE USE

Throughout the past eleven years, E. L. I. as one of the largest geophysical research organizations in the World has contributed many instruments and developed services vital to the Petroleum Industry.

The Birdmen's Perch

WE THOUGHT WE WERE being pretty decent when we undertook to name our fluffy visitor.

It would take only a little of our time, we thought, and we'd be repaid by Oily Boid's gratitude when he

realized that he could go through life with an honest name instead of a number or a code.

We figured wrong.

The quilly quisling has bedeviled us constantly since we told him the Perch Pilots were going to name him, waking us at 5 A.M. to ask for mail. And we can't go places any more without being buttonholed while people explain why *their* name for Oily is the best name.

We're going to put an end to it next month. Good or bad, we're going to pick a name for our pheathered phobia.

Remember, the lad whose name we use gets a life-size portrait of the worm-eater.

Major Al Williams

alias, "Tattered Wing Tips," Gulf Aviation Products Manager, Gulf Bldg., Pittsburgh, Pa.

FLYING OVERCAST—1919 STYLE

Last week we saw a picture of a bomber that *was* the pride of our Army.

This lurching Liberator of 1919 looked like a well dressed warehouse. It had three wings, six motors, and eight wheels. And a speed of 85 mph!

But engineers devised new wing sections, bigger engines, and stronger undercarriages. They so improved design that much of the "ginger-bread" on the old-timer became unnecessary.

Today's bomber can fly rings around the buggy of 1919 because everything not vital to its performance has been dispensed with. Every ounce left is a working ounce.

A few years ago, Gulf men thought there was too much "gingerbread" in lubricants; too great a part of the oil was unnecessary to the job of lubrication. These research men devised a new refining procedure, the Alchlor Process, which was entirely different from old methods. This improved technique got more of the unnecessary "gingerbread"—the dangerous sludge makers and carbon formers—than had ever before been extracted from a lubricant. What remained of the oil did a better job.

Today's Gulfpride Oil does a better job of lubrication than old lubricants because everything not vital to its job of lubrication has been dispensed with. Every ounce of Gulfpride left is a working ounce.

BRAINTWISTER

A mechanic cleaning engine parts had a 1 gal. can ¾ full of cleaning-fluid and another 1 gal. can which was empty. He wanted to measure out an exact ½ gal. of the cleaning fluid without using another can, getting more fluid, or pouring away any of the fluid he had. He did it, too. Can you?

WHOPPER

Dear Major,

We want to join your family!

We recently opened a new airport in Ft. Worth and of course, are using Gulf Aviation Gasoline. We all en-

joy the Perch. This story may seem a little weird, but s'truth.

Right after we opened up here, our first solo student decided he hated the ground. He must have, because he made 17 passes at the runway on his first landing. I was worried because my watch told me the ship was out of gas.

Then I noticed that each time he overshot the field, the intake manifold on his ship reached out to the G.A.G. pump like an ant-eater's beak. When the ground-hater finally did come in, the ship's tanks were completely full.

Is this what pilots mean when they talk about thirsty engines?

Yours very truly,

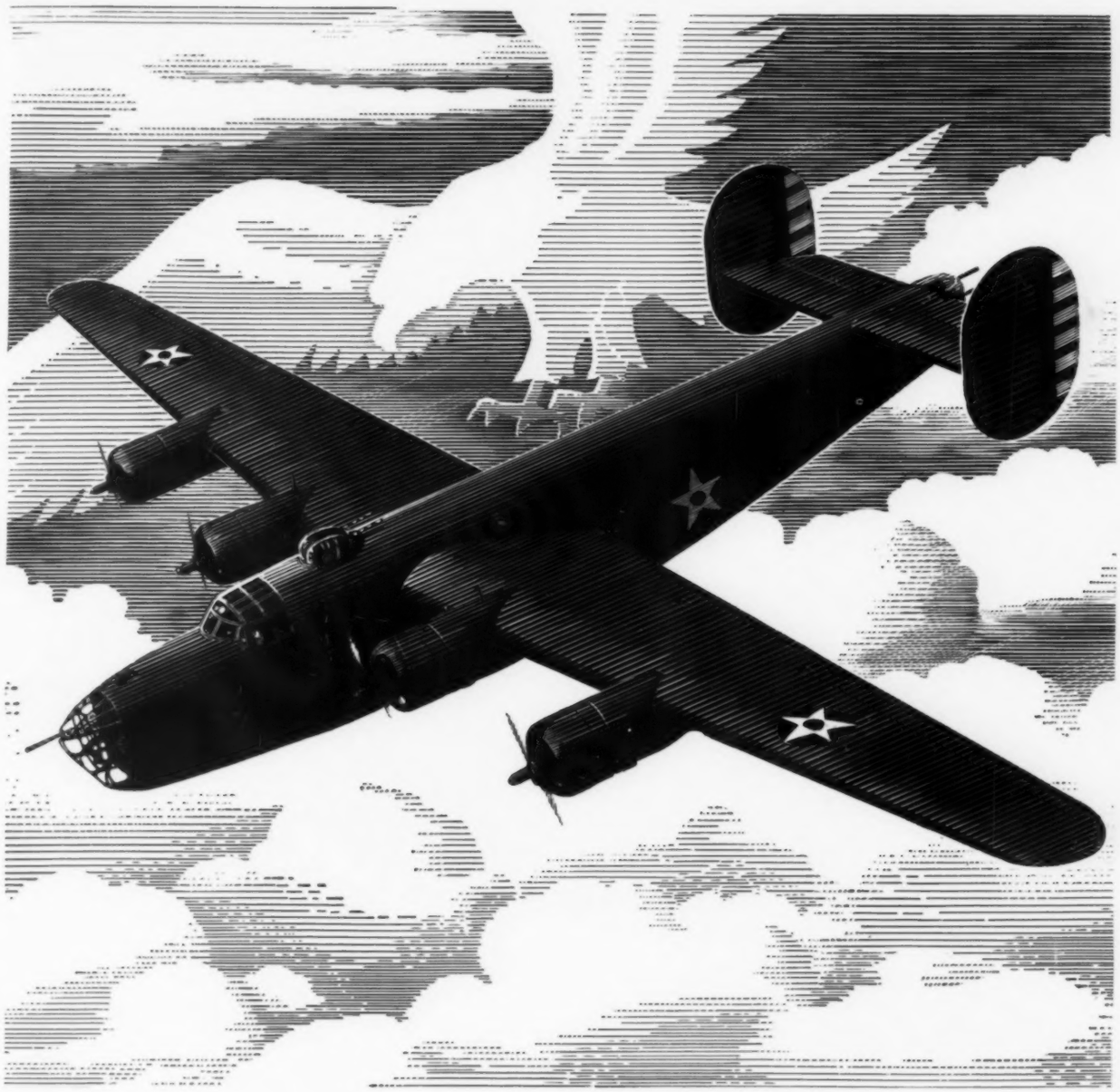
R. J. Coates, Jr.
Instructor, Mid-West Airport, Inc.
Ft. Worth, Texas

Gulf Oil Corporation and Gulf Refining Company...makers of

GULF AVIATION PRODUCTS

OIL IS AMMUNITION—USE IS WISELY!

RUB DOWN, AND VARNISH WOODEN PROPS FREQUENTLY, ESPECIALLY IN HUMID CLIMATES.
THIS WILL PREVENT DAMP-NESS FROM ENTERING BETWEEN THE LAMINATIONS OF WOOD.
CONTROLLABLE PITCH PROPS SHOULD HAVE FREQUENT SERVICING TOO. ANOTHER WAY TO GET FULL EFFICIENCY FROM YOUR PROP...
...IS TO BURN NOTHING BUT THAT GOOD GULF AVIATION GASOLINE
G.A.G.



Now we make it official... *The Liberator*

WE always thought of her by her U. S. Army designation — the Consolidated B-24.

We were so busy setting up the industry's first big-bomber assembly line . . . and passing our mass-production experience on to other manufacturers . . . that we didn't worry much about a name for the B-24.

Then we discovered she had already *won* a name. The British were calling her the Liberator. The American newspapers picked up the name and passed it on to the public. Presently we found that even we ourselves were calling her the Liberator.

So, from now on, Liberator is official. *Consolidated Aircraft Corporation, San Diego, California.*

CONSOLIDATED builds Battleships of the Air

Keep 'em Flying

Brewster
Buccaneer
Dive Bomber

with ECLIPSE
Aircraft Accessories

Specialists in the design and manufacture of that newest of aerial weapons, the DIVE BOMBER, the Brewster Aeronautical Corporation has produced large numbers of both land and carrier based Buffalo Fighter planes for the wide-spread fighting forces of the United Nations.

Ranked with our hardest hitting fighters, these high performance airplanes are equipped with many accessory units of Eclipse manufacture—accessories carefully designed and precision built—to provide the most efficient and dependable equipment possible for our united air forces.

"ECLIPSE" PRODUCTS USED BY BREWSTER AERONAUTICAL CORPORATION

Combustion Starters, Hand and Electric Inertia Starters, Direct Cranking Electric Starters, Solenoid Relays, Battery Booster Coils, Engine Driven Generators, AC-DC Generators, Vacuum Instrument Pumps, Suction Regulating Valves, Oil Separators, De-Icer Distributing Valves, Control Switches and Ammunition Rounds Indicators and Contactors.

ECLIPSE AVIATION DIVISION, Bendix, N. J.

Products of the Eclipse Aviation Division are important members of "The Invisible Crew," which include the Bendix precision-built instruments serving with the United Nations on every fighting front.

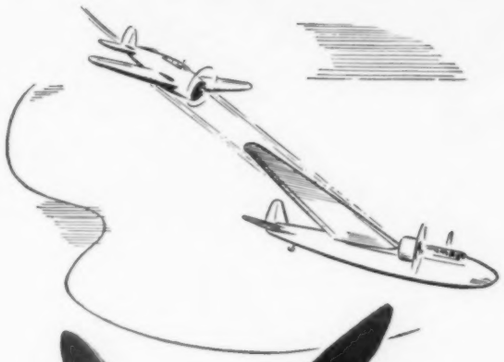
THE INVISIBLE CREW
Precision Equipment by Bendix
AVIATION CORPORATION

FOR DEPENDABLE OPERATION, IT PAYS TO FLY "ECLIPSE" EQUIPPED

Copyright 1942, Bendix Aviation Corporation

HIGH IN THE SKY A "THUNDERBOLT" *STRIKES*

...its Pratt & Whitney Engine powered by SHELL



SOARING into the stratosphere the new Republic P-47 strikes with rapier speed and spurts away . . . the fastest thing on wings!

Shell Aviation Fuels and AeroShell Oils play a vital role in many of the engines of these man-made comets. Dozens of America's leading plane and engine manufacturers, aviation training schools and airline operators depend upon Shell for top performance.

Here is a preference that is growing month by month . . . one which makes it profitable for airport operators everywhere to stock Shell Aviation Products. For information, address: Shell Oil Company, Incorporated, 50 West 50th St., New York City, or 100 Bush St., San Francisco, Cal.

From model of Republic P-47 "Thunderbolt," courtesy Republic Aviation Corporation.

A FEW OF THE AIRCRAFT MANUFACTURERS WHO USE SHELL AVIATION PRODUCTS

Curtiss-Wright . . . Grumman . . . Lockheed . . . Fairchild . . . Consolidated . . . Vultee . . . Ryan . . . Monocoupe . . . Taylorcraft . . . Timm.

[Also Suppliers to the U. S. Army, U. S. Navy, U. S. Marine Corps]

SHELL

AVIATION FUELS • AEROSHELL OILS

Just Among Ourselves

TIMIDITY'S HOUR HAS PASSED

Germany's war against the world entered its fourth year this month with Hitler's strength virtually unchallenged by boldness and effectiveness. Even while the Germans were extending their masses and their communications deep into Russia, Germany itself remained untouched except for sporadic raids by British and American air power. The German factories hummed in dozens of fortified cities, although a few, like Cologne, had collapsed under heavy air bombardment.

Why the delay in all-out U. S.-British air action?

Until recent events shocked the public into an awakening of sorts, the delay could have been blamed on the lack of air-thinking by the people.

It is true the public was kept in the dark on aviation for years by the mistakes of unseeing Congressmen, swivel-chair generals and water-logged admirals. The people have been denied aviation. The Navy didn't believe in airplanes. The Army didn't want a bunch of happy-go-lucky aviators running their show. The government didn't want air transport at the expense of outmoded surface transport. Neither the Navy nor the Army saw any value in private flying, so the putt-putts were damned, too.

But we don't believe public indifference to air power can be blamed any longer. The public knows that bombers sent battleships to the bottom of the Pacific ocean nine months ago. The lesson of air support was etched into the hearts of America by the sacrifice of Bataan. Henry J. Kaiser, with an "idea" as old as the PBY, has captivated popular fancy and loosened the strings which held back Consolidated, Douglas, Curtiss and others. Air transport is moving supplies and armies across the seas. The pay-off has come, as could have been expected, with the putt-putts—the Civil Air Patrol, limping along as the ragged little orphan of aviation, has enabled civilians in store-bought khaki to find and sink enemy submarines and thus fight the war right here at home.

The folks at home know all these facts. They have found aviation to be real and tangible—not a dream or a fancy. They are resigned to win with aviation when other means fail, and they don't intend to lose by sitting idly on the sidelines with the greatest weapon ever devised resting inanimately or being frittered away hapazardly in vague operations and experiments.

Public opinion demands that American air power be applied to Germany. He who ignores, or even underestimates, the public awareness of aviation will sooner or later have a lot of explaining to do.

WE NEED A WINGED ARMY

By MAJOR AL WILLIAMS
Courtesy Scripps-Howard Newspapers

We Americans are in position to spring the greatest surprise of all wars since Genghis Khan put his entire army on horseback and ran the foot soldier armies of ancient Europe off their feet.

Our horses have wings, and, like the nomadic horsemen from whom Genghis Kahn recruited his army, our people are temperamentally and physically adapted to flying these winged horses.

Genghis Khan's horsemen rode mounts that were by no means race horses. They were shaggy, hardy horses that could be ridden by the run-of-the-mill of the men the Khan had available. The analogy seems so plain that one wonders why everybody in the country isn't talking of America's "Air Army."

The hardy, durable air mounts for America's Air Army can be turned out like hot cakes. We've been running around behind 90- and 100-horsepower engines on wheels and making a pretty good job of keeping such engines running day in and day out. It's engines of this type that are the power plants for America's Air Army. Hardy, tough engines of not more than 80-100-horsepower that require no clinical experts to tinker and wet nurse them.

If Genghis Khan had waited until he had bred race horses and his men all had become super-jockeys Genghis Kahn would have been a warrior known but a short distance beyond his own village.

We have the men and we can certainly build hundreds of thousands of sturdy, simple little airplanes capable of carrying three or four men. But we seem to lack the inspiration somewhere at the top. We are, in short, meeting the Axis with weapons they to a large measure have decided to use against us.

The same observation applies to tactics.

Take paratroops, for instance. We scoffed at paratroops until the Nazis used them successfully.

But the paratroop idea is only one step removed from an Air Army equipped, if you will, with little, shaggy airplanes—thousands and thousands of them—flying over the treetops and jumping over enemy positions to positions ten to fifteen miles behind the front.

The paratrooper telegraphs his arrival. Any alert and armed citizenry can muffle a paratroop invasion force especially in the limited number of paratroopers trained and used today.

It is my belief that any sound, healthy young American can be taught to stagger off the ground and land in a light-powered airplane in about the same time it takes to train an expert paratrooper. We have the materials, the plans for the equipment, the factories to fabricate these air mounts and the men to fly them, but . . . we hesitate.

You can't shoot a Jap or a Nazi with tradition. We've got to break with military and naval tradition. Most of it is in the book and won't work now. If we can do that we can perhaps turn up with an air army to spring a surprise swarm attack all over the enemy.

Admiral William Simms risked a career to revise the shooting technique of the Navy. Admiral Bradley Fiske risked a career to force the service to use the deadly torpedo plane. And now we are waiting for a leader who will dare risking his career to put an Air Army into action.

Five hundred thousand such air mounts—with the men to ride them—could swarm all over Germany. And this type of plane could be flown broken down to Europe and be assembled there. One bee can hurt you. Ten bees can make you sick. But a hundred bees can kill you.

WESTERN UNION

BUFFALO NEWYORK.

COL. CLAIRE L. CHENNAULT=
THE OFFICERS AND GROUND CREWS OF THE AMERICAN VOLUNTEER GROUP. VIA: U. S. DEPARTMENT OF STATE.

PLEASE ACCEPT OUR SINCERE CONGRATULATIONS AND OUR APPRECIATION FOR THE MAGNIFICENT MANNER IN WHICH THE AMERICAN VOLUNTEER GROUP HAS PERFORMED. YOUR SUCCESSFUL ENDEAVORS IN THE FACE OF OVER-WHELMING ODDS HAVE DEMONSTRATED CONCLUSIVELY THAT ONLY VICTORY CAN LIE AT THE END OF THE ROAD. WE ARE PROUD OF THE PERFORMANCE THE CURTISS PLANES YOU USED IN COMBAT HAVE SHOWN AND PLEDGE OUR EVERY EFFORT TO IMPROVE DESIGN, PERFORMANCE AND PRODUCTION THAT THE UNITED STATES ARMY AIR FORCE OF WHICH YOU HAVE NOW BECOME A PART WILL BE ASSURED THE FINEST FIGHTING AIRCRAFT IT IS POSSIBLE TO CONCEIVE.=

THE EMPLOYEES AND MANAGEMENT CURTISS-WRIGHT CORPORATION AIRPLANE DIVISION BUFFALO, NEWYORK.

CURTISS-WRIGHT SALUTES THE *Flying Tigers*

The exploits of the American Volunteer Group in destroying superior numbers of Japanese invaders in Burma and China are now epic. Today Curtiss P-40's of still greater fighting ability are helping to make America's Air Forces invincible on every world front.

CURTISS-WRIGHT
Corporation
AIRPLANE DIVISION

FIRST
Since the Birth of Aviation

1922 · First Army Hawk, 420 h.p. Flown by Lt. R. L. Maughan in first coast-to-coast, dawn-to-dusk flight—150 m.p.h.

1929 · Six years of development finds this P-6 Hawk with greater horsepower—625—and many improvements.

1937 · Retractable landing gear (a 1931 development on the Navy Hawks), a speed of over 300 m.p.h., a 1100-H.P. engine, were among the notable advances on the P-36 series.

1942 · Since the production of the original P-40's, this famous series has undergone four successive "step-ups" to new high performance levels in speed, ceiling and striking power.

SECOND PRINTING: Send 10¢ for your copy of this fascinating 96-page history of aviation by Assen Jordanoff, author of "Your Wings", with illustrations of current fighting types. Airplane Division, Curtiss-Wright Corporation, Buffalo, N. Y.

Bell Airacobras Respond to Dawn Alarm

Take-off
WITHOUT TRUMPETS

Charging down the runway with throttle wide and tail in air an Army Airacobra quickly pushes down the earth—then rises high above the clouds on call to duty.

No trumpets blare—no banners fly as squadrons of these fast and agile fighters of the sky ascend to battle. Yet, dramatic as it seems and is, it is the daily routine of Army Pilots.

And just as Airacobras climb swiftly skyward, so has the Bell Aircraft Corporation that builds them—without fanfare or ostentation—climbed swiftly into mass-production.

Working day and night, without pattern or precedent in an infant industry, ingenuity and engineering skill were severely taxed to perform "impossible" tasks. New production methods had to be devised—parts and assemblies designed as well as the tools and equipment that were required to produce them.

Then came the building of an organization—the gathering together of thousands of men and women, strangers to each other—unskilled in the work they were about to do—yet eager for the tasks at hand.

Training—intensive training—was the order of the day, training in the handling of machines and tools, training that would form the habits and customs of a new-born industry.

How well this job has been done is indicated by the rising and fighting power of Airacobra Squadrons in our fighting forces and from the high praise that comes back from fighting fronts. © Bell Aircraft Corporation, Buffalo, New York.

Airacobras for victory—

FUTURE PLANES FOR PEACE

BELL *Aircraft*

PACEMAKER OF AVIATION PROGRESS

AIR SPEED INDICATOR
TELEGON REMOTE INDICATOR
(Quadruple Engine Unit)
SENSITIVE ALTIMETER
DIRECTION INDICATOR
(Compass)
ELECTRICALLY HEATED PITOT-STATIC TUBE
MANIFOLD PRESSURE GAGE
CRADLE OF PRECISION
Many of the world's most important contributions to precision aircraft instruments have been cradled on the Kollsman drafting board. The first practical Sensitive Altimeter and the Direction Indicator are notable examples.
Kollsman craftsmen have, in fact, either created or refined almost every type of precision aircraft instrument.
Those shown here are but a few of the more familiar types—their faces open to view and easy to read, which is typical of Kollsman design.
These instruments and many others—many of them only ideas stirring in the minds of Kollsman engineers in our great research laboratories—are Kollsman's contribution to aircraft of the United Nations at war today . . .
And to the commercial and private planes that will circle the earth in a world at peace tomorrow.
VERTICAL SPEED INDICATOR
TACHOMETERS
(Direct and Remote Indicating)
ENGINE GAGE UNIT
FREE AIR THERMOMETER
(Ice Warning Indicator)
KOLLSMAN
AIRCRAFT INSTRUMENTS
Division of
SQUARE D COMPANY
ELMHURST, NEW YORK • GLENDALE, CALIFORNIA
DETROIT, MICHIGAN

What's all this talk about Altitude?

Aircraft have missions to perform at *various* altitudes.

All military aircraft are designed to give their best performance at some SPECIFIC altitude.

If it's WAY UP you are talking about, up as high as a fighting plane of any nation has ever sought or met an enemy, that's as much HOME as any other level to an Allison engine.

For the Allison engine, combined with the turbo-supercharger, is the power that makes the Lockheed "Lightning" (shown above) the world leader at the highest altitudes at which planes fight.

And when comparing American fighting planes with foreign competition, don't forget that the American ships carry more weight because of their superior protective armor, heavier fire power, longer range and better instrumentation.

LIQUID-COOLED AIRCRAFT ENGINES Allison

DIVISION OF GM GENERAL MOTORS

I'LL BE SEEING YUH!

Neither bombast, nor pilot's "hunch" are in this simple statement. ☆ ☆ ☆ When a task force pilot takes off in an American built plane he's confident that he'll be back — safe and sound. He knows his training is the finest on the earth, his ship the best in the air, and he looks forward eagerly to each new flight as another prized entry in his log book. ☆ ☆ ☆ ☆ Front page headlines from all over the world emphasize the job our pilots are doing up the line — and those of us at home who supply planes or parts cannot relax our efforts for a single instant. ☆ ☆ ☆ Here at Aeronca we stress our efforts as — solely "First and Finest" for the men of the United States Armed Forces. ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆

Aeronca Aircraft Corporation, Middletown, Ohio.

AERONCA

The Aeronca Victory Award

The Aeronca Aircraft Corporation pledges its entire resources of equipment and experience to produce only the finest in material and manufacture for the men who are privileged to fly for their country. ☆ ☆ ☆ ☆ The — Aeronca Victory Awards — presented to employees for skill that develops better products or creates time-saving operations — are our dedication of an "all out" pledge to win the war in the shortest space of time.

AERONCA

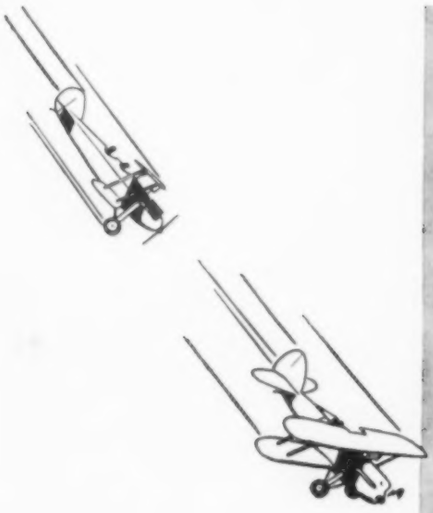


PHOTO BY LAWRENCE LOWRY

IT'S DEPENDABILITY *that Counts*

• In a secondary trainer, it's dependability that counts . . . and Waco's dependability under every weather condition is what makes Waco the outstanding trainer all over the Western Hemisphere.

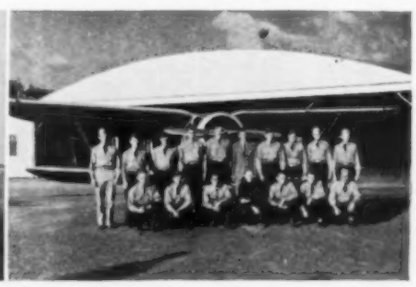
North Aviation, of White Bear Lake, Minnesota, uses Wacos exclusively for secondary and acrobatic work at their Type A training center. Under temperatures ranging from as high as 101° in the summer to as low as —40° in the winter, their Wacos are on the line day after day, training future instructors for our Air Forces . . . combat pilots for Wartime and Airline pilots for peacetime.

You'll find Wacos wherever you find CPTP operations. The Operator KNOWS he can depend on Wacos . . . and to the Operator IT'S DEPENDABILITY THAT COUNTS.

THE WACO AIRCRAFT COMPANY • TROY, OHIO, U.S.A.

Below are two groups of future pilots and instructors at North Aviation. On the left, are Central and South American, and on the right, North American students.

The Wacos are used for secondary, acrobatic and cross country training.



depend on Continental *Red Seal* Engines

The "Grasshoppers" also depend on Continental Red Seal Power for performance, economy and long life.

Waco's husky CPTP trainers can take the manhandling and gruelling workouts in training programs. They are reliable — safe — maneuverable, and at all times have trustworthy *Continental Red Seal Power* to depend upon.

Continental Motors Corporation

Aircraft Engine Division

MUSKEGON, MICHIGAN

SAFETY IN REVERSE

It's got to where it is safer to make an unexpected forced landing than to practice one. Three times as safe, says the CAA. You'll live longer by learning why from this vital analysis.

By THE SAFETY BUREAU
Civil Aeronautics Administration

DURING the calendar year 1941, 133 simulated forced landing accidents in non-air carrier flying were reported to the Safety Bureau. Of these, 118 or approximately 90 per cent occurred in instructional flying, predominantly dual. The number of student pilots in 1941 increased approximately 53 per cent over those in 1940, and it is reasonable to assume that the amount of instructional flying increased in like proportion. For this same period, however, the number of simulated forced landing accidents in instructional flying increased approximately 190 per cent. From these figures it would appear that measures adopted during the calendar year 1940 to increase the safety of this training maneuver had not accomplished the desired results. Nevertheless, it is significant that there has been a definite reduction in the number of such accidents resulting in serious or fatal injury. Only 10.2 per cent of the simulated forced landing accidents in 1941 involved fatal or serious injury, compared with 24.4 per cent in the previous year. Similarly, the percentage of aircraft washed out and receiving major damage was reduced from 92.7 to 75.4 per cent.

Table I gives a comparison of the simulated forced landing accidents reported in instructional flying during the calendar years 1940 and 1941, showing their frequency in terms of the average number of students for those years.

Table I shows that the accident rate in simulated forced landings occurring during instructional flying nearly doubled in 1941 over the previous year. Table II shows that the proportion resulting in fatal or serious injuries to persons was reduced by more than half. The reduction in the proportion which resulted in washout or near washout damage to aircraft, while not quite so pronounced, was about one-fourth.

Table III includes all simulated forced landing accidents reported for the calendar year 1941, in instructional and other flying. It is arranged to show cause in relation to injury and damage. Approximately half of these accidents were collisions with wires, trees, fences, etc., and with the ground. By collision with the ground is meant inadvertent contact through descending too low. As a matter of fact, all sixty-one of the collision accidents resulted from continuing the simulated forced landing maneuver to a ridiculously low altitude leaving no margin of safety in case of momentary power loss, unseen obstruction, or difficulty with student.

The following are typical examples of how these collision accidents occur in simulated forced landing practice: In the pull-up after a simulated forced landing, the undercarriage caught on a high tension wire causing the aircraft to nose over. The pilot and passenger received serious injuries. The aircraft was washed out. In another, the aircraft struck a wire fence and nosed over on its back. Fortunately, the instructor and his student escaped without injury. In another, during a low approach, the left wheel inadvertently contacted the ground with sufficient force to shear it off. The aircraft nosed over—a washout. The instructor and student were fortunate

TABLE I—SIMULATED FORCED LANDING ACCIDENTS (Instructional Flying Frequency)

Calendar Year	Average Number of Student Pilots	Number of Simulated Forced Landing Accidents (Instr. Flying)	Percent of Student Pilots Involved
1940	60,000	41	.07
1941	92,000	118	.13
Increase	53.3%	190%	86%

TABLE II—SIMULATED FORCED LANDING ACCIDENTS (Instructional Flying—Injury and Damage)

Calendar Year	Total Accidents (Instr. Flying)	INJURY			DAMAGE		
		Fatal	Serious	Minor and None	Washout	Major	Minor and None
1940	41	6(14.6%)	*4(9.8)	31(75.6)	9(21.9)	29(70.8)	3(7.3)
1941	118	4(3.4%)	8(6.8)	106(89.8)	10(8.5)	79(66.9)	29(24.6)

*Percentages of total accidents.

TABLE III—SIMULATED FORCED LANDING ACCIDENTS (Instructional and Other Flying Nature)

NATURE OF ACCIDENT	INJURY				DAMAGE		TOTAL
	Fatal	Serious	Minor and None	Washout	Major	Minor and None	
Collision:							
Wires, Trees, etc.	1	2	32	3	13	19	35
Fences, etc.	—	—	12	—	9	3	12
Ground	1	—	13	3	7	4	14
Sub-total	2	2	57	6	29	26	61
Stalled	4	6	16	8	18	—	26
Engine Failed	—	1	38	2	32	5	39
*Miscellaneous	—	1	6	—	6	1	7*
Total	6	10	117	16	85	32	133

*Miscellaneous includes: two cases in which landings were continued to completion on soft ground; a dual control stick came out; a student freezing controls; a student jamming rudder control with foot; a propeller failure at low altitude; and a whirlwind.

TABLE IV—SIMULATED FORCED LANDING ACCIDENTS—1941—Against Actual Forced Landing Accidents

LANDINGS	ACCIDENTS	INJURY				DAMAGE	
		Fatal	Serious	Minor and None	Washout	Major	Minor and None
Simulated	133	6(4.5%)	10(7.5)	177(88.0)	16(12.0)	85(63.9)	32(21.1)
Actual	573	10(1.7%)	16(2.8)	547(95.5)	41(7.2)	458(80.0)	74(12.9)

to escape with minor injuries. In still another, the landing gear and wing tip struck the ground. The aircraft bounced back into the air and the pilot managed to fly it back to the airport.

Letting down too low before obstructions and stalling the aircraft in an effort to clear or avoid them proved the most serious mistake. This resulted in four fatal accidents, six serious ones and the washout or near washout of the twenty-six aircraft involved. The following is a typical example of a stall accident: After letting down in a simulated forced landing, a climbing turn at low altitude was attempted in order to avoid trees. The aircraft stalled into the trees, resulting in serious injuries to the instructor and minor injury to the student. The aircraft was washed out. Collision was next with two fatal and two serious accidents and thirty-five washouts or near washouts. There were no fatal accidents as a result of engine failures, although one involved serious injury and thirty-four of thirty-nine aircraft received major damage or more.

Table IV furnishes a comparison of simulated forced landings reported during the year 1941 with accidents resulting from actual forced landings in the same period.

Proportionally, there were nearly three times as many fatal and serious accidents in simulated forced landing practice as in actual forced landings! Likewise, the number of aircraft washed out in simulated forced landings was proportionally nearly twice as great as in actual forced landings! Major damage to aircraft ran higher in actual forced landings as would be expected. How simulated forced landings should be practiced has been a highly controversial subject since early pilot training days. The CPT Service is fully cognizant of this and has continually worked to make the maneuver safe. One great improvement was to require instructors to familiarize themselves thoroughly with the terrain over which the maneuver was to be practiced by actually studying it from the ground. This undoubtedly influenced the change whereby, in ratio to the amount of flying, fatal and serious accidents were reduced by more than half, and damage to aircraft, one-fourth.

In 130 of the 133 accidents, the maneuver was continued to such low altitudes that either collision with ground obstructions could not be avoided, or no margin of safety was left in case of powerplant trouble or student error. Fourteen of these accidents resulted from inadvertent contact with the ground. These are inexcusable. The twelve collisions with fences and other low objects also indicate a dangerously low ground approach that is entirely unnecessary. This too has been recognized by the CPT program in a recent regulation requiring that all secondary CPT students complete their simulated forced landings at an altitude of 200 feet above the terrain.

This study should prove of special interest to school operators and instructors, since 90 per cent of the accidents occurred in instructional flying, mostly dual. Two rules, applied with reasonable judgment, would prevent these accidents:

1. Know that the field you have chosen, over which to perform simulated forced landings, is adequate in all details to complete a landing safely in case of emergency.
2. Discontinue the descent at a reasonable altitude above surrounding obstructions, not less than 200 feet, to permit free maneuvering in case an emergency necessitates an actual landing.

Nothing is lost in teaching or practicing a simulated forced landing by terminating the descent at 200 feet. At this altitude, the pilot instructor, or student, knows that he either has or has not made a *proper approach* to the chosen area. This is as much as

NOT ALL THE
"Fire Power"
Comes from Guns
Exceptional fire-power marks the performance of the Consolidated "Liberator". But not all its "fire-power" comes from guns. Steady fire-power is furnished each engine cylinder on every power stroke by "BENDIX-SCINTILLA" Aircraft Magnetos. Precision built "BENDIX-SCINTILLA" Spark Plugs, Switches and radio shielded ignition harnesses are other members of "The Invisible Crew" of instruments, controls and accessories built by 15 Bendix Divisions.
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THE WORLD'S FINEST AIRCRAFT IGNITION

He-men Working
The officers and crews of the merchant marine and the flight personnel of overseas transport planes are *front-line fighters every trip.*
For this is a war of the Seven Seas and the boundless sky — a war in which transportation is the very life-blood of victory. Getting men and materials—*where* they're needed, *when* they're needed—is a gigantic job. It demands the all-out efforts of the nation's united transportation resources.
American Export Lines' men on new fast cargo ships are plying the seas between this country and distant shores.
American Export Airlines' men in great four-engine long-range aircraft are flying a new transatlantic air service.
We are proud of these men and pledge the full resources of our co-ordinated international transportation system.
American Export Lines Airlines
25 BROADWAY, NEW YORK
KEEP 'EM SAILING . . . KEEP 'EM FLYING

the simulated forced landing maneuver is designed to accomplish. Naturally, the student must be taught to land on a predetermined spot as well as to approach the area. This, however, can be done more easily and with more safety by practicing at an established airport. The practice maneuver must be made safer than the actual forced landing.

The outstanding fact brought out by this study is that in ratio to total accidents, nearly three times as many fatal and serious accidents occurred in simulated forced landings where the pilot-in-charge chose the time, altitude, and terrain, as in actual forced landings where the pilot suddenly was confronted with the realization that he must immediately complete a landing regardless of terrain or other conditions.

Admittedly, teaching the student pilot adequately to meet the emergency arising from engine failure is of great value and importance to any well-rounded training program. However, when the training maneuver proves more hazardous to the pilot than the emergency for which he is being trained, something is wrong. The preceding figures definitely point out what was wrong. All but three of these accidents resulted from continuing the descent to such a low altitude that no margin of safety was left.

★ ★ ★

July Safety Record

Twelve fatal accidents were reported to the Safety Bureau for the month of July, 1942. All of these accidents occurred in non-air carrier flying.

There were four spin accidents, one of which occurred during test flight. There were three collisions in full flight. One was with the surface of the water, one was with the ground, and the other was collision with a mountain during instrument weather conditions. One fatal accident resulted when a seaplane which was taxying to a dock struck a small motor boat.

In the four other cases, the investigator's reports have not yet been received.

A table comparing the fatal accidents in June and July, 1941 and 1942 follows:

	Non-Air Carrier
July, 1942	12
July, 1941	36
June, 1942	*11
June, 1941	22

*One report was received after the release of information on June fatal accidents.

The Instructor Fights on *EVERY* front

WHAT red blooded American wouldn't like to be twins when it comes to fighting the Axis? Well, sir, there's one fellow in this fracas who's more than twins. He's the Primary Flight Instructor who multiplies his military effectiveness by the number of aviation cadets he can train. *Through them he fights on every front.*

One of the war's most vital jobs is to properly train combat flight personnel. Pilots can be made or broken in the first 60 hours of training. And the responsibility is largely the Flight Instructor's. Above all, he must inspire confidence.

The confidence inspired by the instructor may well spring from his faith in the organization that employs him. Ryan employees are justified in that faith.

RYAN

RYAN SCHOOL OF AERONAUTICS
San Diego — Hemet, California

RYAN SCHOOL OF AERONAUTICS of Arizona
Tucson, Arizona

DEDICATED FOR THE DURATION TO THE EXCLUSIVE TRAINING OF ARMY PILOTS

On his firm's twentieth anniversary Ryan came out with a plywood plastic trainer for the Army.

Ryan's 20 Years

By BILL WAGNER

WHEN T. Claude Ryan put his foot across the threshold of the aviation industry's ground floor, his capital consisted solely of ambition, a never-say-die spirit that characterized the young barnstorming army pilots of those days, and the privilege of using a landing strip set neatly in the midst of a network of electric wires, a couple of poles and a smokestack or two in the vicinity of San Diego's waterfront.

Today, exactly twenty years later, his irrepressible enthusiasm still as effervescent as ever, the name Ryan is known wherever airplanes are flown, and its owner presides over the bustling enterprises which are the Ryan Aeronautical Company, and its affiliates, the Ryan School of Aeronautics, and the Ryan Aeronautical Institute.

With the first low-wing monoplane accepted by the U. S. Army for primary training, Ryan Aeronautical Company has supplied the Army Air Forces, as well as the U. S. Navy, hundreds of sleek, graceful aircraft in which many of today's war aces first learned to fly. In addition, the Army Air Forces of the Netherlands East Indies, China, Guatemala, Mexico and Honduras have trained their young pilots in large numbers of Ryan military trainers.

T. CLAUDE RYAN
President, Ryan Aeronautical Corp.

Originator of many outstanding developments in the specialized field of airplane exhaust system design and manufacture, and pioneer of new and radically different but now universally accepted manufacturing techniques for volume production of sheet metal parts, Ryan's subcontract manufacturing division has produced huge quantities of exhaust manifolds now playing their part in consistently efficient performance of U. S. combat plane engines all over the world.

The Good Old Days

Ryan founded one of the first flying institutions to receive the Department of Commerce's highest ratings, and has seen his school of aeronautics grow phenomenally, until today a heartening stream of Army aviation cadets every month pours out of the Ryan Schools in San Diego and Hemet, California, and Tucson, Arizona.

And the newest Ryan venture, the Ryan Aeronautical Institute, is providing home study training designed to qualify air-minded men and women for key positions in the industry.

T. Claude Ryan went to San Diego in 1922 as an Army reserve pilot flying on temporary status at Rockwell Field. Behind him was a long and finally successful attempt to become a flying cadet and later a flying officer in the Army Air Corps, and a period of forest fire air patrol piloting in Northern California and Oregon conducted by the Air Corps.

Even as a boy in his birthplace, Parsons, Kansas, Ryan was deeply impressed by the aviation literature of those days. Probably the greatest event of his juvenile life was his first sight of an airplane, the Wright Model B biplane flown over Parsons by Cal P. Rogers in the fall of 1911 on the initial transcontinental flight of a heavier-than-air craft.

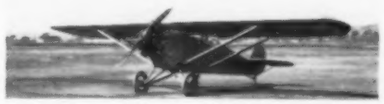
When the family moved to Southern California from Parsons, Kansas, Ryan saved money earned during summer vacations and borrowed more to pay $500 for all of 400 minutes' instruction at a decrepit flying school in Venice. He learned—too late—that the school's finances and equipment were equally shaky, and although the only plane which could fly had to be patched together again after every landing, Claude's enthusiasm for avia-

RYAN-STANDARD cabin plane of Ryan's Los Angeles-to-San Diego Air Line.

tion was intensified. His solo flight, after instruction from the immortal Al Wilson, consisted of a hop to an altitude of 30 feet and a rapid descent that resulted in a smashed propeller. The cost of fixing the prop was the straw that finally broke the school's financial back.

Claude meanwhile had been desperately knocking on the doors of Army aviation, but he was rejected several times because he was under the then minimum required age of twenty-one. A waiver was finally granted him, on the strength of a recommendation from the flying school (despite the solo flight debacle), and Ryan received notice to report to the recruiting station for assignment late in the fall of 1918. He no sooner arrived at Army headquarters when news of the Armistice was received. His services would no longer be needed.

The never-say-die youth returned to school, studying engineering for a year at Oregon State College, and applying for the new flying cadet classes then being formed by the Army. Near the close of 1919, his ambition was realized. He was accepted as a cadet and sent to March



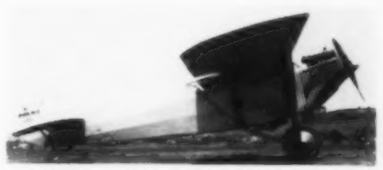
RYAN M-1 was used to survey coast airways. Its efficiency caused sensation.

Field, California, for his first genuine flight course, with primary instruction in Jennies and advanced training in Sopwith SE-5 pursuits, and DeHaviland DH-4Bs.

From Airports to Airlines

Assigned to the forest fire patrol, Ryan flew his DeHaviland over heavily timbered mountains at altitudes up to 10,000 feet until his active service ended in January, 1922. When Claude returned to Southern California to scout for a position in commercial aviation, he discovered there was no such thing. He had to content himself with a stop-gap job in an auto supply house, but his heart was somewhere else. He came to Rockwell Field to refresh his flying, and almost inadvertently took the first step of his long, twenty-year climb toward the pinnacle of the aviation industry.

He learned that a landing strip along San Diego's waterfront had been abandoned, quite involuntarily, by an operator with whom the federal government had an argument over smuggling of Chinese across the nearby Mexican border. Following rapid negotiations with the Harbor Department of the City of San Diego, owner of the property, Ryan made a hurried trip to North Island, and purchased from the Army one of its wartime Jennies. With an aging airplane, a packing crate for an office, and a midget runway for an "airport", T. Claude Ryan established himself in his first business enterprise.



RYAN M-2 was better and had Hispano-Suiza engine and spare wheel (below fuselage).

Business was skimpy at the waterfront landing field, and besides, Ryan was getting tired of taking off under high-tension lines, dodging two poles and the mast of a dredge to get his Jenny in the air. He moved to a salt flats farther up the bay, and proceeded to make history. It was just about this time that the government was disposing of its war stock of planes considered militarily outmoded, and Ryan, one of the industry's shrewd opportunists, successfully bid a few hundred dollars for six Standard biplanes and spare parts to be shipped from Texas.

When they arrived in San Diego, Claude learned why the government was so willing to part with its property for a mere pittance. The aircraft were in extremely deteriorated condition, and without realizing it at the time, he and his crew of mechanics began performing the first "manufacturing" job of the Ryan Company. In that noteworthy group were Hawley Bowlus, who was to become one of the nation's foremost authorities on sailplanes and gliders; Martin Jensen, famed pilot; and John van der Linde

RYAN BLUEBIRD gave passengers more visibility and became famous overnight.

SPIRIT OF ST. LOUIS filled Robertson Aircraft Corporation specifications for N. Y.-Paris hop.

and Dan Burnett, now key production men of the Ryan Aeronautical Company.

Birth of Ryan Monoplanes

They redesigned and virtually rebuilt the two-place open cockpit Standards into five-seater cabin jobs, and equipped the planes with 150-h.p. Hispano-Suiza engines. When their work was done, the erstwhile dilapidated ships were respectable appearing planes, the kind that gave a prospective passenger a feeling of security. And Ryan began doing a highly lucrative sightseeing business, flying as many as 100 eastern oglers a day, at $5 per ride.

Flying people for hire led naturally to teaching them to fly, and the Ryan organization, which had then grown to a size worthy of such a title, embarked on the flight training activity it has conducted for almost two decades.

Alert to all kinds of business possibilities, Ryan and one of his students entered a partnership that launched the Ryan Airlines, Inc., with great fanfare on March 1, 1925, operating several passenger planes on a regular daily scheduled flight between San Diego and Los Angeles. It merely cost

RYAN GOLDBUG was built to Frank Hawk's own ideas of excellence.

$17.50 one way and $29.50 round trip, and since the latter figure was the daily operating cost, the partners figured that all they would need to break even was one passenger daily. To the accompaniment of such elementary mathematics was the first year-'round, regular-schedule passenger airline in the United States born.

Ryan did not stop rescuing airplanes from the Army's salvage lists and rebuilding and remodeling them. Early in 1925, he acquired for the airline the Cloudster, built by Donald Douglas, and first forerunner to the great series of Douglas airplanes. When

Claude received it, the Cloudster had three open cockpits, with a total capacity, including flight crew, of eight persons. Ryan enclosed the cockpits in an extensive rebuilding job, made a single cabin to accommodate ten persons, with a space forward for pilot and mechanic or co-pilot.

In this structural form, the plane might well have been considered the first modern-type airliner in the country, with passenger facilities almost comparable to those of the Boeing 247, "daddy" of today's big carriers.

But Ryan was yet to design and build a plane of his own from the ground up. He saw his chance to become a full-fledged manufacturer late in 1925, when the government was preparing to turn air mail delivery over to private contractors. The DeHaviland biplanes then used by the Post Office could be improved upon considerably, Ryan believed.

He thereupon designed and built the M-1, a high-wing monoplane, powered with a Hispano-Suiza engine, able to carry 800 pounds and cruise at 115 miles per hour—twice the load and a greater speed than the DeHavilands, with double the engine horsepower, could boast.

Vern C. Gorst, who was later awarded the first air-mail contract on the Pacific Coast, a night scheduled run between Los Angeles and Seattle, depended from the inception of his rather ambitious plan on Claude Ryan for technical advice and the operational set-up of the airline. Result of this collaboration was Pacific Air Transport, which was later to become the Pacific Division of United Air Lines.

Ryan and Lindbergh

Gorst contracted with Ryan for a fleet of Ryan M-1 mail planes equipped with Wright J-4 Whirlwind engines. Preceding the sale of the first planes to Pacific Air Transport, Claude Ryan personally piloted the first Ryan M-1 mail plane with Vern Gorst as passenger on an aerial survey of the Los Angeles-Seattle route. With a full cargo and flying most of the way at 10,000 feet, Ryan shattered inter-city records en route in a phenomenal performance.

When Ryan's M-1 in a match race at Vancouver, Washington, defeated a special Army D-H flown by Lt. Oakley Kelly, ace who had made the first non-stop transcontinental flight, the new product had definitely established itself. Pacific Air Transport bought seven, and Colorado Airways, Inc., and the Clifford Ball Airlines of Pennsylvania each ordered others and the Ryan manufacturing business began to hum. Altogether, twenty-three planes were built during the first year of production, a remarkable early-day record.

The M-1 was followed by the M-2 and the "Bluebird", first Ryan cabin monoplane. Incorporating still further design advancements, the first Ryan B-1 Brougham was begun in 1926, and sold to the late Frank Hawk, noted speed flier. Jack Northrop, famed designer, assisted Ryan technicians in the engineering work on the Brougham.

Ryan then sold the original manufacturing business to his associate before the close of that year, but agreed to remain as manager for several months until a new executive could be found. It was during this period that the Robertson Aircraft Corporation of St. Louis, and one of their air-mail pilots attracted to the performance of the Ryan monoplanes, queried the concern:

"Can you build a plane with a Wright Whirlwind J-5 engine, capable of making a non-stop flight from New York to Paris?"

Ryan and other company officials calculated rapidly, determined the job could be done, and within a few days the Robertson pilot arrived. He was a lanky, taciturn young fellow named Charles A. Lindbergh, who virtually lived beside the "Spirit of St. Louis" as it was rushed to completion in sixty days by the Ryan crew, many of whom are still with the Ryan company today.

At about the time Lindbergh's plane was completed, Ryan gave up his active part in management of the concern to represent Siemens-Halske, engine producers, a European concern manufacturing radial air-cooled engines in the same horsepower class as the widely used OX-5 water-cooled engine.

It wasn't long after Ryan obtained the exclusive sales and manufacturing rights for the power plants, to be distributed by the new Ryan Aeronautical Corporation under the name Ryan Siemens, that seventeen airplane concerns were using them. Deliveries fell behind schedule, and Ryan, just married to Gladys Bowen, San Diego school teacher, combined a honeymoon with a business trip to the home office in Europe.

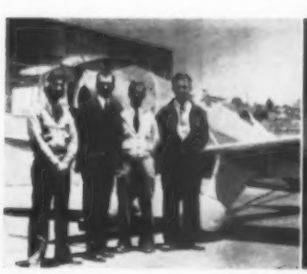
On his return to the United States, Ryan disposed of his agency, and began devoting his time to his Ryan Flying School, where he lay the foundation for pilot training on a modern basis.

The S-T Makes Its Debut

It was at this point, twelve years ago, that a young man by the name of Earl Prudden went to work for Ryan, and it wasn't long before he had been advanced to general manager of the school division of the Ryan organization's activities. Under his direct guidance the Ryan School's program of intensive and progressive development has been carried out. He still fills the position of Vice President and General Manager of the Ryan School as well as being Vice President of the parent Ryan Aeronautical Company.

In 1931 the organization was incorporated under the present name of Ryan Aeronautical Company, and in the midst of the depression, Ryan exhibited his vision by building new administration and school buildings and hangars. Slowly, the company flowered in a bleak economical desert.

In the unpromising year of 1933, the Ryan Company brought out the first of the S-T metal-fuselaged mono-



RYAN S-T and its creators: John Fornasero, T. Claude Ryan, M. C. Boyd and Will Vandermeer.

RYAN S-C became the most popular sport plane of its day with its stylish lines and cabin.

RYAN STM-52 was widely used by Netherlands East Indies as trainer before invasion.

RYAN YO-51 was called "Dragonfly" because of its sensational ability for Army liaison work.

planes that were to become the company mainstay and one of the most noted sport and military trainers in the world. Two years later, they were rolling out of the Ryan plant on a production basis, and proceeded to make outstanding performances in scattered parts of the globe.

Tex Rankin won the International aerobatic title in a stock model S-T; Anesio Amaral, Jr., for five years defeated all comers in the annual air cruise of the Aero Club of Brazil, with his Ryan; Capt. K. M. Frewin in one of the graceful monoplanes won the annual aerial derby at Melbourne, Australia.

The Mexican, Guatemalan and Honduran governments were immediately attracted to these trainers for military purposes, and orders began to pour in to the factory. China and the Netherlands East Indies gave the Ryan Aeronautical Company its first mass production contracts, before the U. S. Army, in the summer of 1939, finally adopted the Ryan as the first low-wing primary trainer it ever used. Today, the PT-22 of the Army Air Forces and the NR-1, the Navy counterpart, may be seen at many training fields providing fundamental flight instruction for future aces.

Big Business Finally Arrives

The old Ryan factory was almost ready to burst at its sides, so great was the volume of business, and as a result the present factory on the opposite side of Lindbergh Field, was erected in June, 1939. Since then numerous extensions have been built, and when the Army ordered huge numbers of the trainers, Ryan was ready to produce them.

The Ryan parts manufacturing division, specializing in exhaust manifolds for all types of planes, was meanwhile growing proportionately as fast as the airplane division. Today great quantities of manifolds are turned out by the Ryan Aeronautical Company to improve engine performance of America's war craft.

Enrollments of private students at the Ryan School of Aeronautics reached an all-time peak in 1939, and the institution, one of the oldest of its kind in the country, was one of nine selected by the government to supplement the primary training program at Randolph Field, Texas, as the Air Corps stood on the threshold of undreamed expansion. With the project an unqualified success, Ryan's pioneering helped in the establishment of today's widespread network of flying schools training the crews for America's staggering plane output.

Last of the Ryan monoplane models produced for the sportsman pilot before the war was the S-C, a metal cabin ship which held promise of tremendous demand from private owners. Production on this craft was sidetracked as war work took precedence over all other manufacturing.

Another recent Ryan development was the spectacularly performing YO-51 "Dragonfly," an observation plane useful for behind-the-lines liaison between various ground units. This craft is capable of extremely steep takeoffs and landings with amazingly short runs, and can virtually "hover" in mid-air, somewhat like a helicopter, though possessing a speed capacity far in excess of that type aircraft.

Today the Ryan company is one of the major aircraft manufacturing concerns, whose yearly volume of business measured by dollars runs far up into the eight figure class.

It's been a long, hard pull these twenty years for T. Claude Ryan, and the capable and loyal key men who make up the team that are the backbone of his fine organization, but the courage of men of his type held together at least the skeleton of an aircraft industry until the government found that with a little nourishment it could out-design and out-build anything in the world.

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DESOLATE HILLSIDES and swamps are tough sites for airports. But Aviation Engineers have the "know-how" and the equipment to overcome obstacles like these.

The BASES of Air Power

Success in the air won't come from men and planes alone. Without bases they couldn't operate. But they're getting the bases—around the globe. Meet aviation's newly adopted teammates, the Aviation Engineers.

By TOM ASHLEY
Official Signal Corps Photos

Of the three essentials on which America's growing air power depends, it would appear that only two—men and materiel—have occupied the attention of those who laid the plans. Out of years of practice by trial and error, from the scientists as well as from the old-timers who taught us to fly by "the seat of our pants", from civilian and military research have come the world's finest methods for training pilots and mechanics and other crew members. Our aircraft builders, guided by an intangible something which would not let them quit no matter the difficulties, have struggled against handicap after handicap to furnish airplanes—the finest in quality and the most in quantity.

But there's another essential for success in the air, especially on a global basis. It is bases—airdromes and landing strips from which our men and materiel must operate. Without them our vaunted pilots and aircraft would be of little use. Even in England, whence our Air Forces in mid-August launched at long last the American air assault on Europe, there were insufficient ground installations for Hap Arnold's crew. The RAF had been able to provide only the installations it required. We had to build our own. At that it was relatively simple, for in England there were materials and equipment. Not so in far-off places like Libya, Africa, India, China, the Aleutians. Thousands of miles from civilization our bombers and fighters have to depend on improvisation for bases.

Started Training in 1939

But America was ready for the task of scratching air bases from hills and valleys, filling swamps and clearing forests. Highly trained, fully equipped crews of base builders went into action in many out-of-the-way places before the Flying Fortresses started their impressive string of victories.

In August, 1939, actual steps were taken to provide the world-girdling Air Forces with bases. The start was accomplished by creating an organization of special engineers for Air Force work. They called them "aviation engineers" and a small detachment of Major William N. Thomas, Jr., Corps of Engineers, and three enlisted men was assigned to headquarters of the GHQ Air Force. By June of 1940 the first troop unit, the 21st Engineer Regiment (Aviation) had been formed at Fort Benning, Ga., commanded by Lt. Col. Donald A. Davison of the Corps of Engineers. It soon moved to Langley Field, Va., and began perfecting its duties.

WHILE A BULL DOZER levels the ground (right), crews rush handy lengths of metal into place for a mile-long runway. There won't be any sags or mud holes here.

POWERFUL MACHINES quickly convert new ground for steel landing mats. This scene (below) is common in Alaska, Africa, England and other war theatres.

Duties of Engineers

By and large, its tasks simmered down to these:

Improvement or provision of advanced airdromes, together with all appurtenances such as runways, landing strips, shelters, airplane parking areas, internal routes of communication, water supply, light and other utilities.

Improvement or provision of routes of communication to such airdromes.

Provisions for gas-proofing essential parts of such installations.

Camouflage of advanced airdromes and other Air Force installations.

Assistance in the anti-mechanized defense of advanced airdromes by construction and defense of road blocks, and by combat against raids delivered by ground forces.

Assistance in the defense of advanced airdromes against air attack.

Maintenance and repair of airdromes, especially after damage by enemy bombers.

Organization

These comprise a large order. But the aviation engineers have been released, at least in theory, from having to contend with rear area airdromes of a more or less permanent nature. Aviation engineers are intended primarily for "pioneer" work on the more advanced airdromes, where speed is essential and the utilization of existing facilities or improvisation of new ones is indicated. The "more permanent" bases usually are the work of engineer general service regiments.

Even so, the typical battalion of aviation engineers, with a strength of approximately 700 officers and men, has no less than 220 pieces of heavy equipment and 146 vehicles. The equipment includes asphalting and concreting machinery, rock crushers, draglines, pumps, scrapers, bulldozers, rooters, graders and the like.

When the American Air Forces began preparing for engineer services, it was contemplated that each of the four Air Forces then in existence would have assigned to it one headquarters company and not less than three battalions—in other words, a sort of regiment having approximately 2,300 officers and men. But this table has since been outmoded by the doubling and consequent multiplying of our Air Forces.

Two Types of Steel Mats

Without disparaging the heroic Chinese, it should be pointed out that their recent herculean accomplishment in building a Flying Fortress airdrome in only twelve weeks with 100,000 laborers using hand tools, pales into insignificance beside the achievements of Uncle Sam's aviation engineers equipped with modern tools. A battalion of 700-odd men can do a more thorough job, with revetments and camouflage thrown in, in half the time. Moreover, they can adapt several kinds of runway construction to fit local needs—soil-cement, soil-asphalt, two types of portable steel landing mat, and soil stabilization with Vinsol resin.

Of wide interest has been the experimentation with steel landing mats. The problem has been two-fold, requiring a heavy type for bombardment aircraft and an easily-installed light type for fighter planes. The British have made extensive use of a light type called the "Army Track", weighing only about one pound per square foot. AAF officers said it may be that they will find this kind suitable for pursuit squadrons. It does not, however, show anything like the supporting strength of the light bar-and-rod type under American development. Favorable results have been obtained with a heavier bar-and-rod type in tests at Fort Belvoir, Virginia, and excellent results of a still heavier type have been achieved in tests in Puerto Rico. The Air Forces have perfected two separate types of portable runway, each with the desired characteristics of rapidity of construction, camouflage, portability, ease of repair and maintenance, and availability and cost.

Camouflage Highly Developed

Aviation engineers have introduced an entirely new and different type of air base. In doing so their task has been complicated by many factors. The former grass plot has been replaced by an extensive tract of land, cleared of obstacles and with all-weather use facilitated in many cases by hard-surfaced runways. It must be expertly camouflaged. Sometimes it is merely a long swath cut from a forest.

In last year's Louisiana maneuvers, the most elaborate mock warfare ever practiced (its scope exceeded even Germany's pre-1939 preparations), we had an opportunity to see the aviation engineers at work.

They are versatile. We encountered one of them, a sergeant, perfecting a sensational new type of demolition

STEEL RUNWAYS LIKE THIS are making battle-area landscapes safe for the operation of fast fighters and heavy bombers. Two types of metal mats are used. This one consists of thousands of strips, each sixteen inches wide, ten feet long and about one-eighth inch thick. Each locks into the next.

BOMB BLASTS ARE WALLED OFF by splinter-proof tiers of sandbags or other material, which enclose a dispersal pen. Open roof is covered by net and fabric strips.

charge for destroying bridges—an explosive with exceptionally high incendiary qualities. "The average charge only blows a bridge into scrap timber, and these scraps can be handy in rebuilding it," he told us. "My new explosive will not only demolish the timbers but will destroy the scraps by fire."

We also ran into a young lieutenant from Brooklyn who was fast becoming the top camouflage expert in the business. He used paint, sawdust, cottonseed hulls and weeds to "plant" a cabbage patch and an apple orchard across one-half the airdrome, hiding its vast concrete runway. When a Fighter Group moved in a few days later the pilots circled in a quandary, yelling down to the control tower that there wasn't enough space to land their planes. One finally agreed to come down for a try while the rest waited upstairs, but even after a low sweep and plenty of inspection the nervy one became excited and ground-looped to avoid running into the "cabbage patch". He went to the tower and assured his buddies it was a fake, but for them to be careful nevertheless. An itinerant Navy pilot refused to be talked down and flew 100 miles north to an uncamouflaged Army base.

Operational Airdromes Described

Ingenuity works overtime when the aviation engineers take to the field. There is, for example, the unique method of facilitating the landing of high-speed aircraft at night or under adverse weather conditions. They obviously can not install elaborate peacetime lighting. Instead, they place beacons, visible from certain positions only, some distance from the airdrome. Having located the beacon, by means of a series of hooded lights which have been designed so as to be visible at varying altitudes, the pilot is brought to the proper runway at the desired altitude. More hooded lights, dimmed to a minimum intensity with colored filters and by other means, give the pilot his angle of glide and indicate the edge of the runway. Portable floodlights are rarely found in a theatre of operations, the landing lights of the plane being deemed sufficient. Special marker lights are set flush with the ground, but they do not have elaborate underground conduits; a flexible cable running along the surface from a portable generator suffices.

In war areas, runways are the prime essential. But equally as important are taxiways. These must connect all runways and dispersal areas for the efficient and speedy utilization of facilities. In this, aviation engineers have provided what has been sorely needed on many commercial fields—the perimeter taxiway. On landing anywhere on the field, an aircraft taxis without stopping to the outside boundary and onto a strip which will carry it to take-off position or to parking areas without interfering with other traffic. The operational airdrome depends on a network of taxiways, for its aircraft are never left on or near the landing area. They are kept in revetments, or walled-in parking places protected from gunfire and bomb shrapnel. They have shelters for crew members. Only a direct bomb hit will damage the plane, and in such case the thick walls of earth or sandbags will confine the burst to that single aircraft. Revetments are at least 150 feet apart and are scattered over the nearby landscape to avoid straight lines or a prolongation of the runway or other natural bombing runs. It is not uncommon to find bombardment and observation aircraft parked as far as a mile away from the runway. By the system of taxiways, which are camouflaged as roads or obliterated by artificial means, they can speedily travel to and from the runways. Fighter types usually are parked much closer to the field, and kept near the down-wind ends of the runways for quick take-off.

When aircraft are parked without protective cover, they are separated by great distances. A unit of twelve, for example, is broken down into 3-plane elements. Each is parked at least 150 yards from the next and the four elements are at least 200 yards apart.

Arnold Praises Engineers

Operational airdromes are not equipped with built-in servicing and supply facilities. Gasoline, small arms ammunition, bombs and other supplies are literally "on wheels", for they must be delivered to aircraft in dispersed locations.

Reports from the fronts have overlooked the boys who build the bases, but the high command has not. General H. H. Arnold, Air Forces chief, has paid them this tribute:

"We in aviation have always respected the engineer, and appreciated his intelligent assistance in our problems. But it is clear that we military pilots can no longer classify the military engineer as an assistant. He is one of us."

DUMMY PLANES draw enemy fire to areas removed from dispersal locations.

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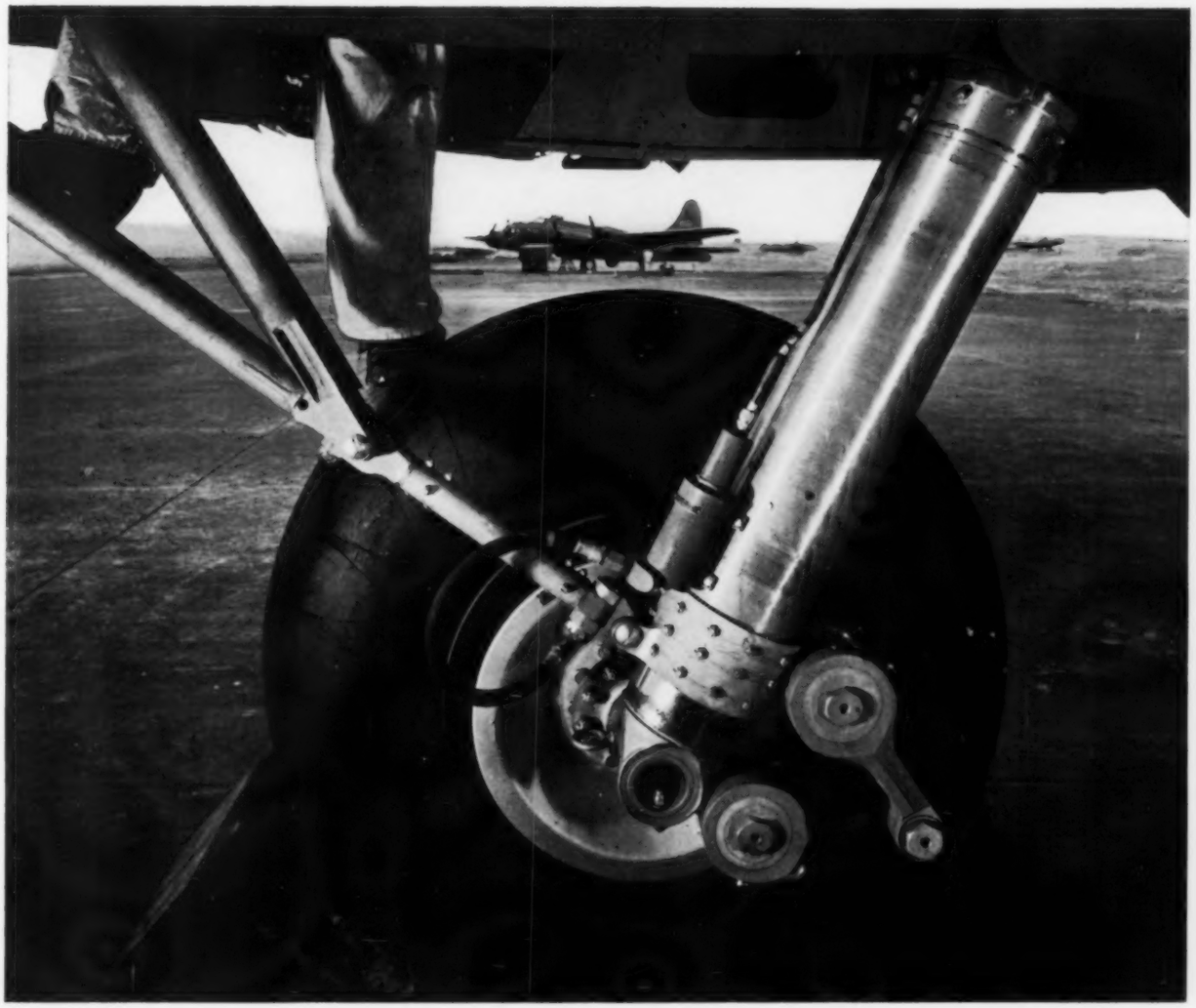


All set for an eighty-ton punch on the nose

In a perfect three-point landing, the landing gear must resist a force equal to the full weight of the airplane. In a moderately bad landing, the impact may double the force to be resisted. On a very bad one the force may be more than tripled.

Try these figures on a 25-ton airplane —a Boeing Flying Fortress,* for example —and you will see why the landing gear has to be able to take it, and take it, and take it.

The design and development of landing gear is part of Boeing engineering history. More than 18 years ago Boeing developed the first oil-hydraulic airplane shock absorber. This type of shock absorber is now in use on all large commercial and military airplanes, including the Flying Fortress.

That the landing gear of the Fortress *can* take it has been proved many times in severe drop tests made by the Army Air Forces at Wright Field . . . and in landings, equally severe, made at other fields—from Hawaii to the British Isles.

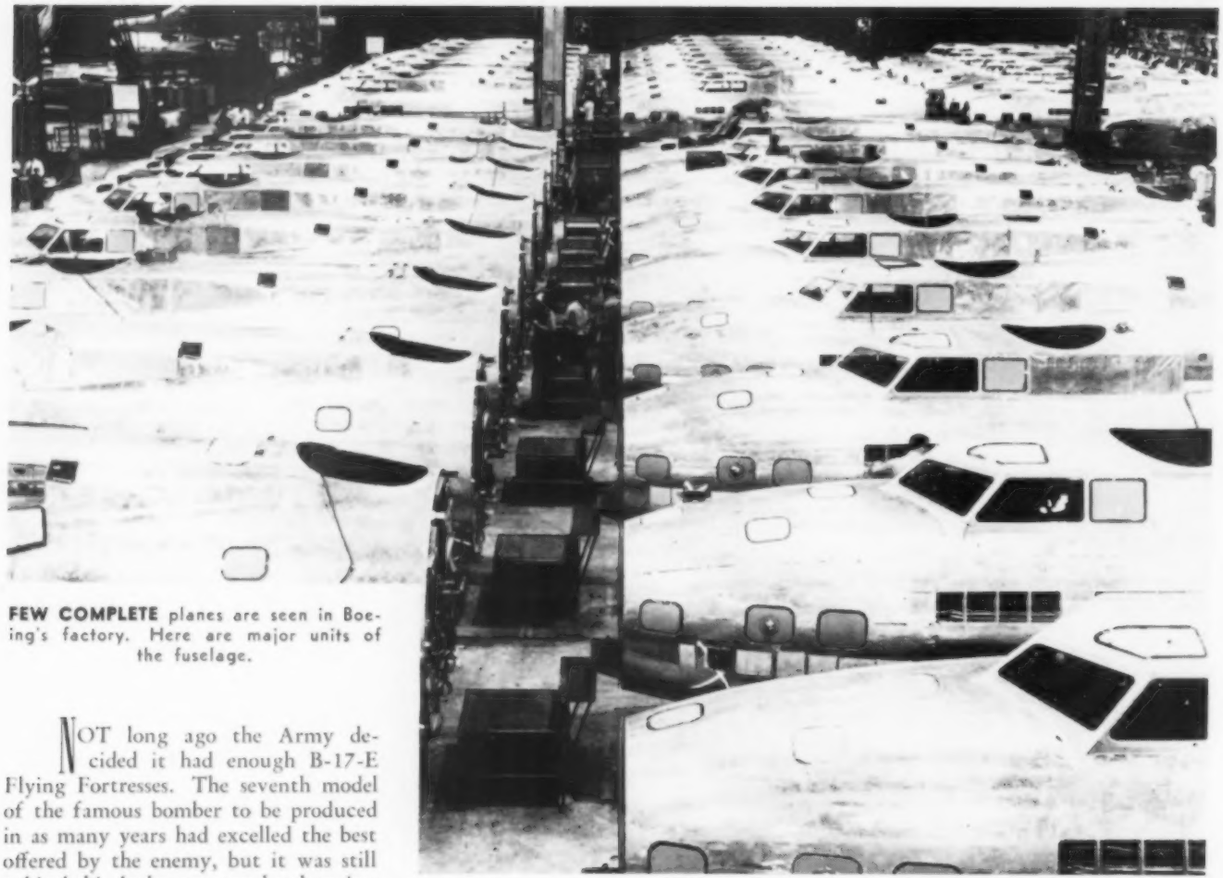
This extra-strong, extra-light landing gear is one of the many reasons why the crews of the Flying Fortresses are so loyal to the mighty bombers they fly. It is one of the extra margins of safety that make the Fortress such a rugged soldier in action. A pilot knows that, when necessary, he can ask a little more from this plane, and get it.

The success of the Boeing landing gear on the Flying Fortress is the result of years of research by Boeing structural engineers working to make stronger, lighter structures out of metal.

The increase in the strength of metal structures . . . together with the decrease in weight . . . is only one of the many projects which form a constant part of the Boeing engineering schedule.

DESIGNERS OF THE FLYING FORTRESS • THE STRATOLINER • PAN AMERICAN CLIPPERS **BOEING**

*THE TERMS "FLYING FORTRESS" AND "STRATOLINER" ARE REGISTERED BOEING TRADE-MARKS



FEW COMPLETE planes are seen in Boeing's factory. Here are major units of the fuselage.

BOEING'S SECRET

While mile-long assembly lines deliver the goods for others, Boeing finds short, compact ones best suited. Raw materials travel shorter distances than at any other large-scale production center. Herewith the story behind the sensation of Seattle.

By GEORGE E. HADDAWAY

NOT long ago the Army decided it had enough B-17-E Flying Fortresses. The seventh model of the famous bomber to be produced in as many years had excelled the best offered by the enemy, but it was still a bit behind the constantly-changing specifications emanating from the battlefronts, where pilots and observers unceasingly study equipment under fire for the purpose of recommending alterations to increase their margin of superiority over enemy developments. "Stop the E's," said the Army, in effect. "Give us some F's."

It wasn't as simple as that, for in reality the new "F" was to contain over 400 changes in design. But on the day the last "E" was delivered to the Army, the Boeing Aircraft Company test-hopped the first new "F"—with those 400-plus design changes. Without interruption, Boeing had performed a major changeover in models—four-engined models at that—and entered production of the new Flying Fortress as if nothing had happened. There wasn't a semblance of a shutdown at Seattle.

This was a remarkable record. Indeed, it and others accomplished in recent months won for Boeing the first joint Army-Navy "E" award to go to the aircraft industry. But it was not so startling to those in charge of production at the Flying Fortress factory. They had prepared for just such an occasion when the B-17 was first developed. Boeing has produced consistently on or ahead of schedules by ingenious production planning and factory methods. The Boeing formula is (1) to make the greatest use of available machine tools before expanding facilities, and (2) to maintain quality *in quantity* by insisting on the most thorough inspection system possible. Boeing produces more pounds of aircraft per square foot of floor space than any other manufacturer in the business.

Production Density Practiced

After receiving the Army-Navy "E" award, Boeing revealed interesting facts concerning its factory methods.

Boeing says its production of Flying Fortresses hinges on "Production Density", a term comparatively new to the industry. Production density means making the most efficient and greatest possible use of manufacturing facilities, concentrating production, planning a short flow of parts through the manufacturing processes so that the plant is a compact integrated unit. This eliminates over-expansion of plant facilities, and results in the conserving of vital strategic building materials, an all-important item in these days when steel production is far from that needed.

It generally has been the practice in the aircraft industry to assemble airplanes into final form at the earliest possible time. The many interior installations are made afterwards, with workers swarming around, over and in the hulking skeleton of the plane like flies around a lump of sugar. Such a practice, in large plane construction, is prodigiously extravagant of space.

To prevent this waste of space, Boeing Aircraft Company has divided up its production into units, or major parts of the plane which, during the process of construction, may be compacted. In effect, Boeing has no final assembly lines, but rather, a final assembly fixture, a station at which, when complete major sections are joined, wires and tubes can be connected; and two positions for final inspection. By accomplishing installations within the major parts, or assemblies, of the plane previous to final assembly, very little of the factory space is used by a completed aircraft.

Boeing's large factory was designed and laid out to produce large four-engine aircraft, a manufacturing field in which Boeing pioneered. Furthermore, this plant was built and tooled for quantity production months before this country's involvement in warfare. Although before December 7 Boeing had a considerable backlog of unfilled orders, production schedules were less than half of those of today. After Japan's attack, the Boeing Aircraft Company, instead of over-expanding their manufacturing facilities, increased substantially their production.

Seven Assembly Phases

Boeing's system of production is both original and amazingly simple, but its very simplicity manifests the tremendous amount of original and organizational thinking that went into the laying out of production facilities. An aircraft of any kind, complete with wings, occupies a considerable amount of space. With a wing spread of more than 104 feet, and a body of over seventy feet, a Boeing B-17 occupies about one-third the space of a regulation football field.

Instead of an elongated assembly line, Boeing uses a very short final assembly process. This is made possible by breaking the manufacturing process of the Flying Fortress into seven distinct major assembly operations: Body minors, or the assemblying of the skeleton of the forward part of the fuselage; fuselage nose section, or the front half of the fuselage; fuselage tail section, or rear half of fuselage; the tail turret, that portion of the fuselage aft of the dorsal fin; fuselage final assembly, where the three parts of the fuselage are put together into a complete aircraft body; wing structures, where the wings are built in sections; and wing installations, where the engines, gas tanks and other items are installed on the wings.

Thus, instead of one long assembly line, carrying practically the entire plane, Boeing uses several long, but compact production lines for major assemblies in which each component part of the plane is virtually completed before final assembly has begun. The saving in factory space required for production is evident.

Fuselage final assembly, wing installation, and tail surfaces, the latter being subcontracted, feed into the final assembly fixture, where the aircraft is finished. By completing each major assembly operation and making every installation possible during this phase of manufacturing, the amount of time and space required for final assembly has been substantially reduced.

Short Feeder Lines

To keep this type of production from becoming bottlenecked, Boeing instituted simultaneously an extensive subassembly procedure. Subassembly at Boeing is defined as the joining together of two or more—and usually more—parts into a portion of an assembly. Subassembly feeds into major assembly, maintaining a smooth, even flow of material through the various stages of manufacturing.

The length of travel of raw materials through to the finished aircraft at the Boeing plant is considerably shorter than in any other comparable plant in the nation. The materials used in manufacturing enter the plant through a single channel. They progress into the fabrication section of the plant where parts are manufactured on giant hydro presses, small punch presses, draw and form dies, welding machines, and many others. With the increased demand for Flying Fortresses, Boeing installed millions of dollars' worth of heavy manufacturing machinery to aid in fabrication. In the days of small orders, these parts were made with drop hammers. Demonstrating the speed-up by using multiple-action presses, the exhaust outlet cowling formerly made by drop hammers required thirty minutes for one part. By multiple-action press, one part can be produced in fifteen seconds, or 120 times as fast. The completed parts go to subassembly, which feeds major assembly, into final assembly then out the door to the Allied nations on the many fronts of the world-wide war.

100,000 Special Tools

Boeing's density system of production is a fluid one, enabling the rapid adoption of design changes. A superior war plane, unlike an automo-

TAKING ON BOMBS at a Far North outpost, this B-17-E awaits another chance to blast Jap naval units in the Pacific. Powerful Flying Fortresses have demonstrated the success of Boeing's formula of maintaining quality in quantity production.

bile, cannot be built in one frozen pattern. As this nation develops a superior weapon, the enemy eventually finds a vulnerable spot, or a means of combating it. This requires a change sometimes of a minor nature, sometimes a major design feature. From the lessons learned in actual combat, the Army makes requests for changes which must be incorporated rapidly into planes being produced. Because of the flexibility of Boeing's scheme of production, changes can be made in a minimum of time, and without affecting the speed of production schedules. The prime example of this fluid system in operation was the change-over from the Boeing B-17E to the B-17F, when the first of the new ships was flown on its test flight the day the final "E" was delivered to the Army. Production of the new model followed that of the old without interruption of production schedules, or without a shutdown for changing production lines.

Production density requires that floor space be utilized to the best possible advantage. Wing jigs, for example, customarily have been set up parallel with the floor. A series of such jigs would require an astonishing amount of floor space. Boeing, again leading the way for the aircraft industry, built theirs skyscraper fashion, putting up a battery of jigs vertical to the floor. One battery, capable of producing several wings, occupies a space equivalent to two horizontal wing jigs.

Over 100,000 special tools of all kinds and classifications have been designed and built by Boeing. The figure does not include standard items such as electric motors, drilling motors, pneumatic hammers, riveting machines, die sets, nor large presses, dies, machines or countless others.

Boeing's tooling department now is hard at work developing ways and means of speeding up even greater Flying Fortress production. Results of an outstanding job here are already evident. Boeing's "Octopus", a circumferential hydropunch, performs nineteen different punching operations at one time, making "V" type slots in the circumferential stiffeners (the metal ribs that encircle the fuselage of the Flying Fortress). This machine, turning out work forty-five times as rapidly as the machine which it replaces, is now also being used by the Douglas Aircraft Company and Vega Aircraft Corporation.

Speedy Die Making

The automatic aluminum spot welding table is another tooling development at Boeing. Aluminum is a tricky metal to weld; it must be clean. Even a fingerprint on the surface will result in an imperfect weld. Boeing's machine, performing sixty-two automatic spot welds each minute, travels a half inch at fraction of a second intervals, pausing for .8 second for each weld. This machine is now being used by other aircraft manufacturers to speed up their production.

Boeing's tooling department is so organized that they can have a new die in operation manufacturing parts within two weeks of receipt of a change request. About fifty per cent of the time, or one week is required for the designing of the die, the other week for making it. This, contrasted to the automotive industry's two to six months in making a die, is a signal accomplishment. Instead of using a hard die steel, as does the motor industry, Boeing makes many of their dies from Kirksite, a special zinc base metal which can be melted in Boeing's foundry, and cast. First a plaster and wood "mockup" of the die is made, to shrink scale. (Kirksite shrinks ⅛ inch to the foot). A plaster mold is made from the mockup, the mold is covered with a lacquer, a plaster pattern made from the mold, the pattern goes into the foundry, is packed in casting sand, the pattern removed, and the die is cast. When cool, the die needs a little polishing to remove the rough marks of the sand, and is ready for use after being checked for accuracy. This die process is particularly adapted to the aircraft industry as seldom is it necessary to make more than five or ten thousand parts from a single die.

Exactly how this method works is evidenced by the tail gunner's door. The door to the rear gunner's compartment of the Flying Fortress as it was first built, required a jig, and over thirty parts, which were assembled by riveting and spot welding. When a die for a draw-and-form operation was made for this job, twenty-six parts were eliminated, along with numerous rivets, and, more important, a considerable saving in time was effected by not having to assemble the door.

Unique Heat Treating

The change of the rear gunner's door was a Boeing design change. Boeing frequently makes such changes whenever they can produce a substantial saving of time in the manufacturing process. Many design changes are requested by the Army, who as operators of the plane desire an addition to the ship providing better protection, or making the Flying Fortress a more potent weapon. Whenever such changes are made, dies or other tools must first be constructed for the job. The tooling designers prepare the new item on blue prints. Tooling fabricators, working as the other half of the team, make the item.

Manifesting the flexibility of Boeing's tooling department, production of aircraft according to schedule was carried out during the change-over from the B-17"E" to the B-17"F", although the latest model Flying Fortress included over four hundred separate design changes. Tools were made and ready for production when the time for production of the new ship arrived. The tooling department, furthermore, can accurately forecast the exact plane on which a proposed change will first appear, enabling the production section to make their plans for it.

Making parts on draw-and-form dies from Dural and Alclad is vastly different from making parts from steel. In the automotive industry it is possible to change the thickness of the steel, or to use metal of a different analysis if the die does not work properly. Aircraft manufacturing, involving maximum of strength with a minimum of weight requires that a certain thickness or gauge of metal be used. The material is always the same, Dural. It doesn't flow in a draw-and-form die, as will many kinds of steel. Heating with a torch, a method used in some press operations of steel, can not be followed on Dural as the aluminum compound will lose its strength. There were a lot of kinks to be worked out in the utilizing of draw-and-form dies in aircraft manufacturing. Boeing did its share of pioneering in this field.

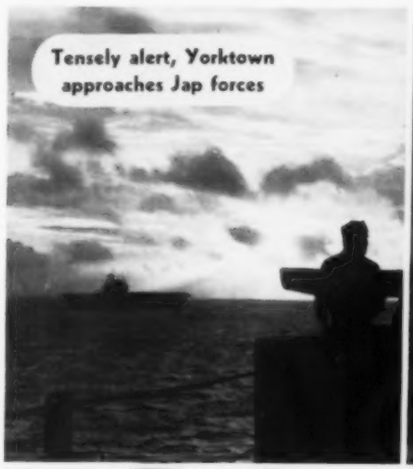
One of the outstanding Boeing accomplishments was learning how to retard the action of heat treating Dural. After a part was made on a form die, it had to be heat treated to provide additional strength. Heat treating causes the metal to warp somewhat, making the pattern out of true. Boeing's method requires putting the heat treated metal on ice—dry ice—after heat treating. The period of setting up, consequently, is retarded as long as the metal is kept at a sub zero temperature. Removed from dry ice, the heat treated parts are put on a restrike die which restores them to their original shape, and shortly thereafter the heat treat sets up to maximum strength.

Ahead of Materials

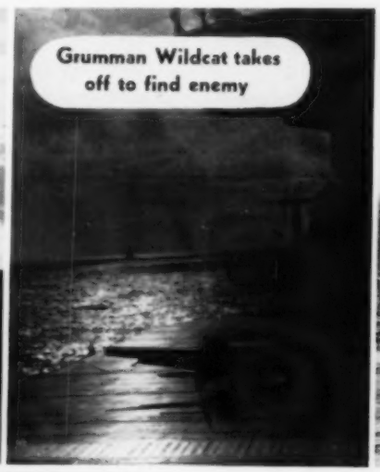
Boeing employes have caught the spirit of all-out production. One worker designed a tool for inserting grommets into rivet holes, which sub-

PHOTOS CITE LESSON OF BOMBS VS. GUNS

U. S. airmen have proved over and over in Pacific victories that the fiercest anti-aircraft fire can't stop bombs and torpedoes. This impressive lesson, which also applies to defensive fire from land targets, is dramatically illustrated by the remarkable U. S. Navy photos below. The carrier **Yorktown,** wading in to knock out Jap units just beyond the horizon, suddenly had to defend itself against attackers. All of its batteries and those on nearby escort vessels went into action. But a luck-shot got through and a Jap bomb struck the **Yorktown.** Note the plight of the Douglas scout bomber, which, out of fuel, landed in the sea. A nearby destroyer rushed up and saved the crew.



Tensely alert, Yorktown approaches Jap forces



Grumman Wildcat takes off to find enemy

Dawn brings alert as observer drops message

Japs ignore barrage, score bomb hit on Yorktown

Out of battle drops Douglas scout bomber, but crew is saved

stantially reduces production time. Another devised a clamp which keeps tension on cables of the B-17 while adjustments are made in the drums. Usable for seven operations, the suggestion has increased these operations during final assembly. More than five thousand suggestions by Boeing employes have been turned in to Boeing, who reimburses the suggester when and if his idea is adopted.

Boeing has not been without production difficulties. Primary among these is the fact that the armed services have taken a considerable number of the younger men who worked on production. These have been replaced by recruits from government-operated vocational schools, who are introduced into the plant as trainees. An expensive method, it is the only way of getting trained workmen and women to keep the production of Flying Fortresses rolling to victory.

Boeing's production plan is unorthodox. It marks as much of a change in American industrial procedure as did the introduction of the conveyor line. Boeing's plan does not utilize a mechanically operated assembly line nor powered conveyor systems, primarily because such a system would limit the flexibility of Boeing's system. Rapid design changes, before being incorporated, might require the stopping of production to change the locations of the conveyor lines. Boeing utilizes mechanized carloaders to transport parts and overhead cranes to transport major sections.

This new type of production was developed by H. Oliver West, executive Vice President of Boeing Aircraft Company, as a plan for the construction of large four-motored aircraft. West, who started more than twenty years ago working in the Boeing shops, rose to his present position through the ranks, and as executive vice president he is the generalissimo of production at Boeing Aircraft Company. West says that Boeing production of their Flying Fortress can be further increased when material manufacturers can supply additional materials.

FAIRCHILD AIRCRAFT, Ltd., of Longueuil, Quebec, Canada, has been licensed by the Curtiss-Wright Corporation to build large numbers of the powerful new Curtiss Helldiver dive bomber. It is powered by a 1,700 h.p. Wright Cyclone. The craft carries unusually heavy bomb loads.

THE Sky's the Limit

BY BILL GREEN

Physical examiners throwing away pilots . . . Army disqualified half those approved by CAA . . . Standardized examinations would stop this waste . . . Salute to business men . . . Better planes and communications needed.

Aviation's Self Destruction

We have just received the results of a Civil Aeronautics Administration study that should shock the nation. Among other things, the CAA makes this startling, damning statement:

"If pilots are sent to enough doctors they will eventually all be disqualified."

And then the CAA, announcing the completion of exhaustive research into the matter of physical examinations for pilots, gives the following recommendation:

"More objective and uniform standards (of physical examination) must be developed."

In other words, the CAA has found in the records of thousands of cases over a period of several years that the medical examiners are destroying aviation. Systematically, on a given proportion, they are throwing away—literally doing away with—the precious supply of the most vital manpower America possesses. This is happening, the CAA discovers, because the medical examiners have no standardized method of disqualifying pilots because of physical defects. One doctor finds one thing, another misses it. Still another examiner ignores his findings. In the end, it has been found, the situation is one where the doctor has a yardstick all his own and he uses it on the basis of his chief clinical interest!

Hold on to your seats, boys, while we go into the record.

Two CAA researchers recently dug into the files. These gentlemen (and we owe them a great debt of gratitude) are Raymond Franzen and Dean R. Brimhall. They had not gone far before they ran into inconsistency, encountering many disagreements among the findings of different examiners of the same pilot. The CAA, reviewing their studies, uses calm language when it reports, for example, that "there is a large range in the severity with which physicians conduct examinations and examiners are very different in the emphasis they place upon various defects. Defects found to be important enough to disqualify by one physician are often not found by another."

It should be pointed out that the researchers studied some 18,400 cases in which a pilot had a defect of any kind recorded at one of the last ten examinations. The consistency of the examiners was so low that pilots appeared in the records as having had and not having defects in bewildering succession.

Military Methods Haphazard, Too

Now all this covered civilian, or private, flying. Bad as the record of the medicos is, it was found to be far better than that of the military examiners. It didn't take long, apparently, to find the reason behind the disqualification of so many CPT pilots by physical examiners in the military services. Here we want to quote the CAA in full, giving verbatim its review of the researchers' findings in an analysis of physical defects found by the armed services in pilots certified to be without disqualifying defect by Civil Pilot Training examination. We quote, supplying our own italics:

"This study was based on 1,286 pilots who had completed primary training and had been medically certified for the secondary stage of Civil Pilot Training. Medical officers of the Army Air Force examined 925 of these pilots and *disqualified almost half of them*. The Naval Aeronautics Bureau medical officers examined 361 and *disqualified about one-fourth*.

"The large difference between the Army and the Navy and the degree of disqualification of previously certified men might easily be explained if the examiners of the Armed Forces employed higher standards of qualification than had the CAA physicians. In the main, however, the *same standards were employed* in both examinations. Considering only those characteristics for which the same measures were used by both CAA and the military and naval physicians and eliminating such defects as might have developed between the two examinations (insufficient dentition, weight, etc.), it was found that of the disqualifying defects noted, *only 16 per cent were recorded as the same* by two examiners. In these cases there was agreement as to the defect and its severity, but the Army and Navy doctors considered the defect to be a flying handicap, whereas the previous examiners had not. *The Army rate of disqualification was found to be twice as high as that of the Navy.*"

Standardized Tests Needed

Now what do you think about that? This is a dead give-away to the most shameful practice in aviation. If it doesn't warrant a full-fledged investigation the following will (and again we quote the CAA):

"One possible explanation of these discrepancies is that the standard used by each physician is to reject *a given proportion of all cases* examined by him, usually *on the basis of the physician's chief clinical interest*, and that this rejection is made *irrespective of the true occurrence of the defect*."

"If pilots are sent to enough doctors they will eventually all be disqualified. More objective and uniform standards must be developed."

Every pilot and every believer in aviation should give a pat on the back to those officials of the CAA who had the spunk and the nerve to discover this disgraceful state of affairs and make it public. Every physician examining pilots should immediately offer his assistance in straightening out this almost criminal waste of pilots. The armed forces, faced with a staggering volume of accidents, should leave no stone unturned to remedy this vicious neglect. Physical tests and examinations for pilots must be standardized without delay.

A Big Hand for Big Men

Because of iron-bound regulations which restrict publicity, the Civil Air Patrol has done its fighting in World War II with a minimum of cheering from the sidelines. The average citizen knows little, if anything, about the vigil along our coasts. To Johnny Public the matter of shore defense is nothing more than some Coast Guards walking the beaches (like the one who led to the capture of the recently-electrocuted German sabotuers) and some Navy boats and planes cruising outside the harbors. Little do the masses realize, much less appreciate, the size and scope of the defense program being conducted around the clock by a vast air fleet of civilian airplanes, manned by civilians and operating from semi-military bases. Volunteers all, these civilians are serving on a front where there has been plenty of action. Coastal patrol is war in every sense of the word, as the CAP has found out.

When victory is ours, the full story, perhaps, of the unique anti-submarine operations by the Civil Air Patrol may be told. It will be a heart-warming chapter of Americana, filled with human interest. We would give anything to be able to tell it now, but because of regulations we will have to forego that pleasure and do our best to keep interest alive by skimming over the cream lightly.

So you'll know them, let us point to a few of the men who are out there flying the deep blue day in and day out, together with those back at the base who service their frail craft and attend to ground-crew duties. It is a motley collection of patriots. At one base we found a seventy-four-year old mechanic. Working with him were young boys. Veteran pilots with thousands of hours behind them are matched by youngsters with just enough to get into the hunt. Bankers and butchers, oil men and former WPA workers, office managers and office boys—it is the darnedest collection of ability you ever heard of. And it is working; they are doing a tip-top job.

A big hand should be given right now to a lot of big men—big hearted, big minded and big thinkers. They could have stayed away from the water without fear of risking their necks and their airplanes. Nobody persuaded them to get into Civil Air Patrol operations. They volunteered valuable time, are using up valuable and almost irreplaceable equipment. There are, just to mention a few, the boys like D. Harold Byrd, G. H. Westby, Earle Halliburton, Al Buchanan, Bill Agey, Bob LeSage, R. L. Bowen and the like. Gene Germany's airplanes and as much of his time as he can spare have counted much more than is apparent.

These and the rest need all the assistance they can find.

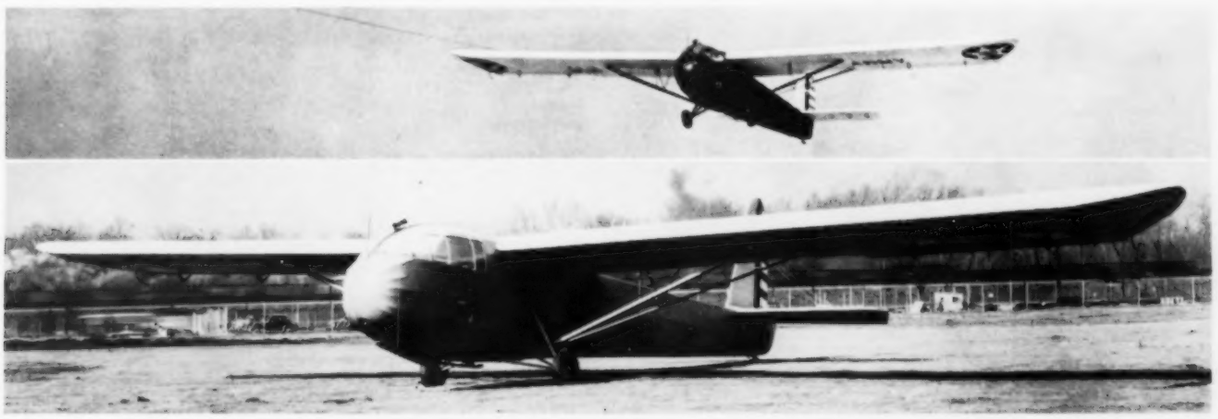
Plan for the Future

Wrestling with puzzles and almost impossible problems which are constantly cropping out in CAP work, one can't help but pause and stop cussing long enough to dream up what he thinks would be the perfect situation. Our idea of perfection simmers down to a future when, at the outset of the next war, we could step into a situation where there would be 100,000 privately-owned airplanes ideally standardized and suited for patrol or courier service. . . . with 100,000 standardized radio transmitting and receiving sets, all working . . . with accessories and gadgets and replacement parts standardized and readily available without priorities and wild goose chasing. Wouldn't that be something!

You can appreciate it even more by considering our present situation. It is true we had lots of civilian airplanes on hand when this fracas broke upon us. But mostly the wrong types. They're good planes, all right, but for certain purposes. Experience has shown that there are about four or five types that lend themselves well to the job of Coastal Patrol. The rest fall short in one of several ways—they can't haul enough . . . you can't see out of them satisfactorily . . . they are a bit too small . . . their generators are too small . . . their batteries haven't enough capacity . . . or something else.

Take communications. Here is a field needing much improvement. We have hundreds of radio transmitters of different types. Some are good, some lousy and others terrible. You can't co-ordinate their use with any degree of satisfaction. They don't use uniform parts and nobody around seems to know anything about some of them. We suggest the FCC or some other agency should set up standards for the construction of all radio equipment. The American Petroleum Institute has done this for the oil business. Then we would have a degree of similarity and interchangeability. One thing particularly impresses us, and that is the tremendous loss of equipment and money in the amateur radio field. Every "ham" has built his own idea of a transmitter. Even though he can regularly communicate with the far corners of the world on just a couple of micro-watts—or, when the inspector doesn't peek, a couple of kilowatts—the outfits they have built can't readily be moved from their present locations without long and costly rebuilding.

Another essential for the future, we think, is compulsory military training for all men. Then when M-Day arrives we can mobilize both military and civil defense units with greater speed and efficiency.



CARGO GLIDERS OF NON-STRATEGIC MATERIALS have been delivered by the Waco Aircraft Company to the Army Air Forces. The craft, equipped for nine men or their equivalent in freight, is being produced in quantity by manufacturers from coast to coast under the engineering guidance of Waco.

WELDING MAGNESIUM *by "Heliarc"*

Helium and ingenuity have tamed the wonder metal for Northrop. Result: Simplified aircraft construction, better craftsmanship and faster deliveries.

By THOMAS E. PIPER
Process Engineer, Northrop Aircraft, Inc.

CULMINATING research over a two-year period, Northrop Aircraft, Inc., is introducing and giving to the war industries "HELIARC" WELDING, and trusts that this new method of arc welding will prove a tangible weapon promulgating to some extent the defeat of our enemy. This new method of arc welding has made possible the use of a new material for aircraft construction which lies in inexhaustible quantities off our own shores, and it has simplified methods of construction that will speed plane output. This innovation has been made possible by the courage and perserverance of two men, V. H. Pavlecka, Chief of Research, and Russ Meredith, Welding Engineer, together with other men of the Northrop organization who believed in them. This new development permits the arc welding of magnesium sheets, extrusions and tubing into structures simpler, lighter, and stiffer than is possible in conventional duralumin construction. At the same time, methods of treating magnesium to make it less inflammable and more resistant to heat have been perfected.

All-Magnesium Plane Practical

The use of magnesium welded structures eliminates the hundreds of thousands of rivets that go into the conventional plane. Rivet heads on the fuselage and wings, even though countersunk, produce resistance to passage through the air, or "parasite drag". At high speeds a substantial portion of the engine power is used to overcome this parasite resistance. In the future, welded magnesium aircraft can be finished just as smoothly as a fine automobile, presenting to the airflow a perfectly uniform and rigid surface.

While magnesium has been used for some time in the aircraft industry for engine parts, wheels and accessories, it has never before been used extensively as a primary construction material because of the difficulties in fabricating. The Northrop "Heliarc" welding process makes possible the all-magnesium plane with its many advantages.

Magnesium is the most abundant metal on the earth and in the ocean. Indeed, about 15 per cent of all the dissolved solid matter in the sea consists of magnesium chloride and magnesium sulfate—enough to cover all the land areas of the earth to a depth of sixty or seventy feet or 9,000,000,000 pounds per cubic mile. The mother liquors from the brine of salt wells are always rich both in magnesium salts and bromides. Nearly all the silicate rocks of the earth's crust contain notable quantities of magnesium. Some of these are of commercial importance; examples are talc, soapstone, and asbestos, cement, and marble. The cost of magnesium alloys at the present time is greater than aluminum alloys. However, because of new magnesium plants under construction and increased production in the plants now in operation, magnesium alloys will be cheaper than aluminum alloys in a very short time. Twenty-four thousand kilowatt hours are required to produce a ton of aluminum from Bauxite and only 18,300 kilowatt hours are required to produce a ton of magnesium, which has 54 per cent more volume. Magnesium alloy will shortly be the most plentiful alloy if it is not at the present time. The world's largest deposits of Brusite, a magnesium-bearing ore is in Montana, Washington, and British Columbia.

Non-inflammable

Contrary to popular belief, magnesium alloys are not inflammable when properly processed; in fact they are more resistant to direct flames than aluminum alloys. Although magnesium alloys are 35 per cent lighter than aluminum alloys and 21 per cent of the weight of steel per unit volume, their weight strength ratio is comparable to aluminum alloys, and they possess the design property of stiffness and rigidity that cannot be obtained in other alloys. With these properties

of magnesium alloys in mind, together with the rapid production method of attachment and aerodynamic advantages which Heliarc welding presents, the future use of magnesium alloys for the fabrication of structures, especially in aircraft, should be greatly enhanced.

Magnesium castings containing foundry defects have been repaired with this process and welds equal to or stronger than the surrounding metal have been obtained. The weld metal is much more dense than that of the surrrounding cast metal and far less susceptible to corrosion. Almost any thickness of cast metal that can be poured may be readily welded with this process.

Welding rod of the same alloy as the parent metal is usually used for castings and wrought alloys. The weld ingot appears to have better corrosion-resistant properties than the parent metal in salt spray tests. The weld bead appears to be cathodic to the adjoining metal, which causes minor pitting of the original metal adjacent to the weld under severely corrosive conditions.

The tungsten electrode is very slowly alloyed with the weld metal and naturally in a period of time the tungsten electrode must be replaced. No noticeable increase in the corrosion rate of heliarc welds in magnesium alloys because of the presence of tungsten has been noticed.

Helium's Role in Process

Heliarc weld ingots have in general an extremely fine grain with practically no grain enlargement adjacent to the bead, indicating that there is a minimum of heating effects on the adjacent metal. This accounts for the very good weld efficiencies obtained on heliarc welded alloys.

Dowmetal J-1H magnesium alloy, heliarc welded, has approximately 95 per cent of the parent metal strength in the weld area. However, at present the design safety factor for welded dowmetal J-1H assemblies is 75 per cent of the strength of the parent metal. These strength values are based on butt welded joints. Fillet, lap, edge, or corner welds are weaker than the butt welded joint and must be stressed accordingly.

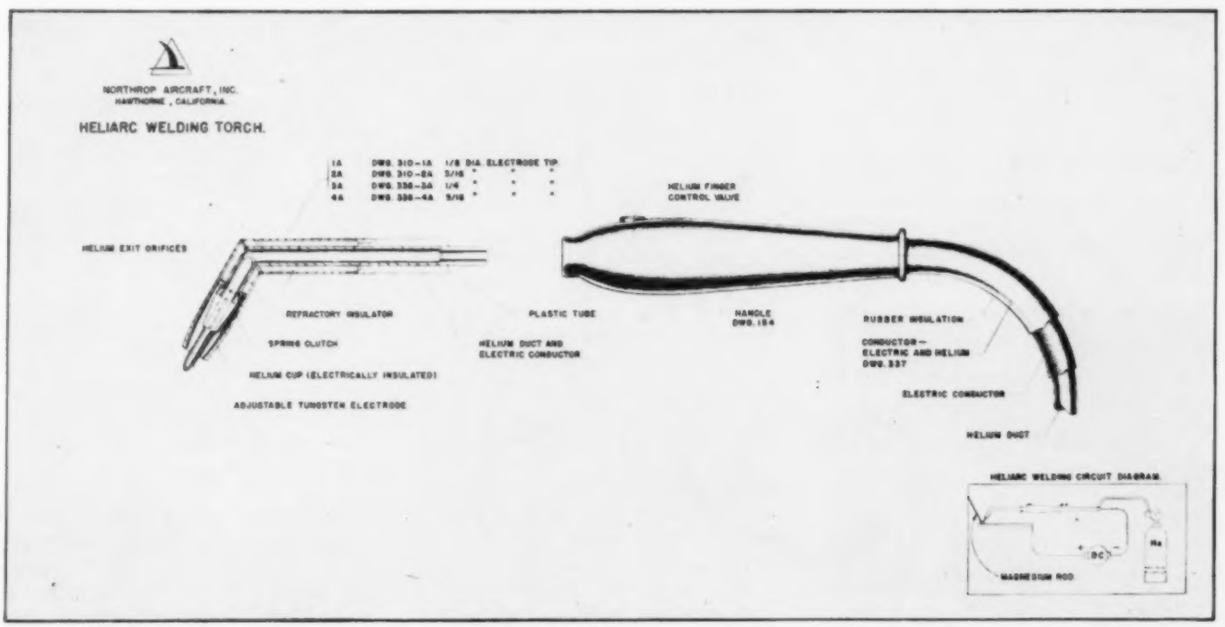
Heliarc welding has proven to be a successful medium of attachment for magnesium, stainless steel, brass, inconel, monel, and some of the carbon steel alloys. Research work is now in progress to extend its use to aluminum and other carbon steel alloys not heretofore heliarc welded. In the heliarc welding process, a shield of helium gas envelops the molten metal. Because helium gas is an inert gas, it prevents oxidation and eliminates the use of a flux and the danger of entrapped flux in the weld ingot that would promote corrosion. The arc in this process is produced directly between a tungsten electrode and the base metal rather than between two tungsten electrodes as is the practice in atomic hydrogen welding.

The Northrop Heliarc welding torch is equipped with a helium valve that is opened just prior to the striking of the arc between the tungsten and the parent metal which feeds helium through the torch to the weld. Helium has over five times the specific heat of air and when in motion prevents heat accumulation around the weld thereby keeping it cooler and giving a better fusion and penetration with less distortion than other welding processes. The arc is struck by a light brushing action and quickly drawn back from the metal.

Special Torches Available

Northrop Aircraft, Inc., has designed heliarc torches which will shortly be available to the industry. The torches are of two sizes to handle one-sixteenth inch to one-eighth inch electrode and three-sixteenths to one-fourth inch electrode respectively and may be supplied with tips of different angles forty, sixty and ninety degrees. The torch may be used for pencil welding or, by extending the handle a handle bar grip is obtained for heavier welding.

A type of torch will later be available that feeds the filler rod automatically, giving more uniform results than where the rod is fed by hand. Best results are obtained by feeding the filler rod into the tungsten electrode which melts off portions of the rod thereby casting a uniform weld ingot. This procedure has been found to be superior to the practice of feeding the filler rod into the molten pool under the arc, whereby the molten pool is not sufficiently agitated to break the crust which gathers on the surface of the pool. Since the reflected heat from the tungsten overheats the filler rod, an angle of sixty to ninety degrees must be maintained between the filler rod and the electrode. The tung-



THE NORTHROP TORCH carries helium to the weld, enveloping the molten metal with inert gas which prevents oxidation, eliminates heat accumulation and allows better fusion. Details are shown here, with the circuit diagrammed in the lower right inset.

SPECIMENS OF WELDING magnesium show the wide range of work accomplished by Northrop. Dowmetal J-1H alloy, heliarc butt-welded, has about 95 per cent of the parent metal strength in the weld area, although the design safety factor is only 75 per cent. Fillet, lap, edge, or corner welds are weaker and are stressed accordingly.

sten electrode varies in size from one-sixteenth inch to one-fourth inch, depending upon the thickness of metal welded and the heat required.

The torch must be held as near the weld as possible to obtain maximum benefit from the helium for the prevention of oxidation. Also an arc length of 0.060 inch maximum should be maintained. Poor penetration or gas holes may result by using too long an arc. On those alloys that have a tendency to be hot short, a rapid welding speed is recommended, approximately three feet per minute, to eliminate the danger of cracking.

Conventional Machines Desirable

A conventional arc welding machine with direct current generator having a 150 ampere output is desirable. However, higher output machines which operate at less than 300 amperes may be used providing lower amperes may be obtained. An upright machine is preferable in that it is easier to attach a helium tank to such a unit. Separate amperage and voltage regulators must be provided and the machines should have a continuous sequence of five increments of current control. The average life of a 200 cu. ft. helium tank is about thirty-five hours of continuous welding with a medium-sized torch. Fairly pure helium gas is required. Normally helium as purchased from the Government plant is sufficiently pure to cause no difficulty. Additional gases in helium such as carbon dioxide, hydrogen, nitrogen and the hydrocarbons may cause pronounced defects. Hydrogen produces bad porosity. Oxygen films the metal causing poor coalescence and inclusions. The presence of 7 per cent nitrogen in the helium reduces the welding speed to about two-thirds that obtained when only 2 per cent is present. All of these gases if present, may be removed, however, by passing the helium through filtering mediums.

MICRO PHOTO shows weld ingot (darker half of print) made of Dowmetal "J" alloy rod blended with Dowmetal "J" parent metal (lighter half).

This method of arc welding has provided an important new tool for the fabrication of structures from alloys such as magnesium and stainless steel. Any type of joint which has been commonly used for welding ferrous metals, may be employed on magnesium and stainless steel.

Stainless steel has heretofore been the most difficult alloy to weld and could only be satisfactorily arc welded by the use of atomic hydrogen, and then only on thicker sections. By the heliarc welding process, thicknesses of less than .010 inch may be very easily welded. In the heliarc welding of stabilized stainless steel the extent of carbide precipitation is very low as compared to other methods of welding which greatly increases its fatigue factor. The medical profession would do well to consider this process for the arc welding of stainless steel braces in bone surgery where spotwelding and other means of attachment have not been so successful.

In the heliarc welding of magnesium structures a tungsten electrode is used with reversed polarity making the magnesium the anode. For ferrous and copper alloys, a carbon electrode is used and the welded structure is the cathode. Craters are eliminated in reverse polarity welding.

For the high temperature melting and heat-resisting alloys heliarc welding has proved successful where other welding methods failed. Heliarc welding gives the greatest penetration of any known welding process.

The Dow Chemical Co. has worked on this process in a parallel vein, and at the annual meeting of the American Welding Society in October they will present the metallurgical aspects of heliarc welding.

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New Cutting Tool Process Saves Metal

A new process in cutting tools which saves strategically important supplies of high grade tungsten, cobalt and molybdenum tool steel, and which is applicable not only to aircraft engine building but to all other industries using lathe tools, has been developed by the Wright Aeronautical Corporation.

Myron B. Gordon, vice president and general manager, said tests, in which over 100,000 alloy steel forgings were machined, show that gains in tool life of as much as 2,000 per cent are possible on high speed lathe tools by grinding and honing the cutting tools to a highly-polished, mirrored finish and also by using a new form of tool to break up the chips and shavings.

Very little high grade tool steel is lost by actual cutting operations. The loss comes from the grinding necessary to sharpen the tools after they are dulled by use. With the new tool shape and polishing process, the number of pieces that it is possible to machine before regrinding has been increased from ten to twenty times.

Parts Makers' Dilemma

Aviation's "little men", the parts makers, are battling heavy odds. Their hard-hitting champion gives his views of the perils which threaten them.

By JACK FROST
Executive Secretary,
Aircraft Parts Manufacturers Association

OUR Association was organized about two years ago when we invited some twenty-five or thirty companies to participate in a conference having to do with subcontractors' or parts manufacturers' problems. The issues were many, and so were the suggestions on how to tackle them, but the formation of the Association was supported the first night by only eight companies. Since that time we have grown to represent approximately 140 companies employing over 50,000 persons in various phases of aircraft parts processing. I use the phrase "aircraft parts processing" knowing that there are among our concerns machine shops, plating companies, foundries, heat treating companies, and die casters as well as those companies actually engaged in manufacturing a specific article used in aircraft.

We issue weekly bulletins to our members and, in fact at times, to the entire industry, advising them on current developments. We also hold semi-monthly dinner meetings, some open to the public with prominent speakers, and some closed meetings where our members can sit across the table from one another and exchange their experiences for the benefit of all. At our larger meetings, we have had many prominent speakers from the Army and Navy, Selective Service, OPA, WPB, RFC, and many of the other Governmental initials. We have had technical men from the major aircraft companies, from trade publications, economists, and many others. When there was some question about the legality of pooling resources for larger production, we went to the expense of bringing Thurman W. Arnold, U. S. Attorney General, out here as our guest where he called on a few of the plants, gave us a talk, and answered questions on the attitude of the Anti-trust Division.

Labor Problem Growing

In representing such a group as ours, we also are called upon by the agencies of the Government to make surveys, to supply information, and to express our views on the effects of pending legislation. So much for the activities of the Association. Let's get down to the problems which are facing us.

First, there is the question of labor, and I don't think we are alone in this worry, although it is probable that the aviation industry in general, due to its terrific expansion, is subject to more labor problems than others. Labor supply is becoming increasingly difficult. We are employing more and more women in certain jobs. However, in spite of the fact that the employment of women makes sensational publicity for those who are publicity inclined, there are still many jobs in which women cannot be employed and many companies are unable through a number of circumstances to convert their shops for women.

For example, jobs in foundries, heat treating, or die casting plants where the physical requirements of the men must be very high and most of them must be in the age bracket needed by the Army. It is difficult sometimes to get these facts over with local Draft Boards, especially when these Draft Board members who are giving their services voluntarily are sometimes inclined to be impatient or unsympathetic with employers or employes who request occupational deferment. Naturally, a lot of men who we feel could and should get deferment, enlist voluntarily. We are doing our best to put women in all these jobs.

About Wage Stabilization

The question of wage stabilization has been brought into the labor supply picture and it has been claimed by representatives of Labor that we have a tremendous turnover due to low wage scales. This all leads to the recent so-called "Wage Stabilization" conference which went on for ten days in Los Angeles with no decision being reached. In the first place, I do not believe that the scale of wages in aircraft parts business is substandard as claimed. The very fact that the aviation industry in Southern California has been able to employ over 300,000 people in the last year from other walks of life certainly wouldn't indicate that their wages were substandard. Comparison with the hourly rates in long-established industries has no bearing. Let's take the automotive industry for example. We hear much talk of their high hourly wages in Detroit. Has the automotive industry ever undertaken to employ so much inexperienced help in one year and keep them busy fifty to sixty hours a week without layoff? The aviation industry has had to do this. Not only does it take time to train inexperienced persons, but while they are being trained there is a certain amount of wear and tear on equipment.

There are many prominent experts and theorists trying to argue these points and reach conclusions. My experience of sitting in with the Working Committee of the Aircraft Wage Stabilization Conference convinced me that the Government agencies, themselves, are going to have to get together to determine what they consider the objectives of the President's Seven-Point Program to stop inflation and also what they consider substandard or inequalities in wages. Our biggest difficulty these days is one agency's demanding one thing while another agency tells us it can't be done —both of them a part of the U. S. Government.

At the Wage Stabilization Conference, which the Labor representa-

tives immediately endeavored to turn into a collective bargaining conference for the increase of wages for the entire industry, OPA took a very definite stand against any wage increases. Labor declared there were some unofficial statements made by other Government agencies which would indicate there should be general increases. Some management representatives seemed to be in favor of increases and certainly all of them were in favor of adjusting local inequalities so that the men on comparative jobs in the same industry would be getting the same wages. The whole thing wound up with nobody answering the "sixty-four dollar" question, and it's being taken to Washington for more Government decisions.

Catalog Prices Don't Exist

Now, let us get into Price Regulations. On July 22, 1942, Price Regulation 136 took effect. This particular regulation affects some of our member companies, who are interpreted as being part of the machine trade. At first the entire aviation industry would have been under this regulation with the exception of prime, airframe manufacturers. To this we objected and objected strongly with the result that there is in the draft stage a Price Regulation which presumably will apply to all aircraft and aircraft parts. Price Regulations seem to be a necessary part of our economy, especially designed to prevent inflation. In so far as aviation is concerned, however, there is ultimately only one customer —that is, Uncle Sam; therefore, practically the only place that we could have any part in inflation is through our wage scales—and there has been no move towards controlling wages. Politically speaking, we all know there will not be any such move until after election.

All of the Price Regulations are drawn up placing a ceiling upon the price of your product and in every case the ceiling has been set at some date two or three months previous to the issuance of the Regulation. In the case of Price Regulation 136 which took effect July 22nd, the base period for prices was limited to those prevailing as of October 31, 1941—eight and one-half months previous.

The Regulation that is being drafted for aircraft and aircraft parts provides that prices be maintained as of March 31, 1942, but there is a section in it permitting labor increases placed into effect before April 27, 1942. In most industries this of course applies to an established catalog price. In the case of aircraft parts or aircraft processing, there are very few such catalog prices. In most cases our work has been done to order.

The aircraft parts industry has control of only one factor entering into its cost; namely, overhead. We have no opportunity to change design, color, or to advertise our product extensively. In most cases we are handed specification for products processed under rigid and strict inspection. The major companies have long realized this and as a result have given many contracts on a straight man-hour basis. In many cases it is impossible to estimate the number of hours it will take to complete a certain job.

So let's review the effect of these Price Regulations on some of our parts companies. Machine shops, plating and heat treating companies are doing work for the prime contractors, generally on a basis of material being supplied by the customer. Under these circumstances all that we are selling is labor, management, and the use of equipment. A friend of mine recently coined a phrase in which he stated that "If wages go up, your prices go up—or your business goes up!" It may be true that some companies have a sufficient margin of profit on their products to absorb large wage increases, but when they do have large profits there are plenty of agencies now in existence who can control them. The Army or Navy can do it through renegotiation of contracts. The treasury department can do it through taxation, because certainly the larger the profits the larger the rate on taxes.

What "Excess" Means

Another objection to the theory that if a company has sufficient profits, it should increase wages, is that it upsets the wage scale in the community thereby compelling others who are operating on a much smaller margin to meet the increase in order to exist.

It is ironical that the phrases "inequalities" and "substandards" so often used in Wage Conferences are entirely non-existent in Price Regulations. If Jones were getting more than Smith for the same product at the base period set forth in the Price Regulation, Jones can still get more than Smith and can continue to do so for the duration — or maybe much longer if present regulations stay in effect. There are many lines of thought and arguments both ways on Price Regulations and Wage Stabilization. We are not arguing for or against them. But the most important factor in the cost of any parts man or subcontractor's production is labor—which runs as high as 70 per cent of the sale price—and my friend's phrase carries a lot of sense.

I mentioned the fact that the Treasury Department could take back some profits through taxes and I was putting it mildly. Normal taxes based on the ability to pay is something we can always expect. But the recent theory of "excess profits" taxation is something no businessman would have anticipated a few years ago. The term or phrase "excess profits" is very misleading. Webster describes "excess" as that which exceeds what is usual or proper. The proposed taxation, which was laid by Congress into the lap of the Senate Finance Committee to worry about does not meet this description as any business man would interpret it. At least not in the aircraft parts industry.

It is proposed that our excess profits be taxed at 90 per cent. But the catch is in the description of "excess profits." Excess profits are any profits which exceed your average earnings for 1936-1939, or any profits which exceed 8 per cent of your capital investment. Now until it is analyzed, that does not seem too bad, especially to those people formerly in non-defense industries who were able to make lucrative profits on non-essential products during 1936-1939. There are not 5 per cent of our companies who will take advantage of the base period option to determine their exemption.

Figures Don't Lie

In the first place, few of them were in existence in 1936-1939, and those that were, had very little business on their books. They were already controlled by certain profit limitations on Government contracts and what little profit remained went into development and research, devising products and methods of manufacturing which have since become necessary to our war effort—and into which another company, that may have been making refrigerators or dish pans at a good profit during that base period, can step right in and manufacture at a larger profit.

Now the 8 per cent on capital investment sounds all right, too, until you stop to look into it. Certainly, it is all right for companies with a long earnings record and the good luck to revert to a peacetime product after this mess is over. In spite of this, we cannot argue very much at this time about our percentage of profits, but we can argue about the effect it will have upon production.

The incentive motive still is in the minds of every investor—and for that matter it is still in the minds of every working man. If there is not sufficient incentive, there is not sufficient production. Individuals, and this ap-

TEXAS BUILDS SUPER AIR CARGO PLANES

While Henry J. Kaiser, assured of WPB orders, wrestled with cargo plane intangibles on the West Coast, Texas' Consolidated factory came up in late August with the real thing—mass-produced 4-motored cargo ships to move today's freight today—not tomorrow. They are adaptations of B-24 bombers, described as capable of carrying more than ten tons, the greatest human or cargo load of any mass-produced aircraft. They carry their own weight in payload, said Consolidated. Speed was announced as over 300 m.p.h. and range over 4,000 miles.

plies particularly to some of our highly paid executives, may patriotically give of their services for nothing, and many have. A corporation, however, is not an individual, and must have profit as part of its economy. Now let's see what this 8 per cent leaves for some of these companies.

A typical corporation is one capitalized at $200,000. Eight per cent means $16,000, plus an additional $10,000 exemption at present proposed, or $26,000. The balance, as proposed, would be taxable at 90 per cent. On $26,000 profit the corporation cannot install many first-class machine tools at the end of its year, let alone put an addition on the plant, or pay a dividend. All right — the $200,000 company is producing at the rate of $3,000,000 per year or twelve to thirteen times its capital investment. Most of our companies are doing just that. On this basis, the allowable profit exemption will be made on the first month's business. And what management would be retained by stockholders if it took on another $2,500,000 or $3,000,000 of business with practically no profit and all the hazards of loss? When I say "practically no profit," I mean it in exactly that sense of the word because the excess profits tax law, while it takes 90 per cent, does not eliminate normal taxes of 40 per cent on your remaining profit and state and local taxes—which will just about use up what is left.

Let's suppose this same company, after it has made its $26,000 exemption, is asked to bid on a necessary war contract. Labor, material, and overhead are estimated at $500,000. Putting another $500,000 on top of this half million, or 100 per cent profit on cost, will result in less than $20,000 profit on a million-dollar contract, or 2 per cent. In order to illustrate the effects this will have upon production, let us reduce this $500,000 to one hundred thousand parts at $5.00 each. The corporation who has experience making this part and whose ingenuity and management have been able to make it for $5.00 cost, has to charge $10.00 to make 20c profit on each part, and so the business will go to another company who may not be so efficient, who has not had the experience, and whose plant may not be properly equipped. But because he made butterfly nets, or golf clubs, or some other article at a good profit during the 1936-1939 period, he can sell the part for $9.00 although it cost him $7.00 to make and is able to keep most of the $2.00 profit for his company.

This will give you some idea of what is going to happen to efficient production if proposed taxation goes through. If the inclination is to charge a ridiculous profit on your product to have a small net return, what is the difference whether or not it is in the original price, or double the price with 2 per cent or 3 per cent profit net?

One company has informed me that he will earn $34,000 profit on a half million dollars worth of business in the first month of operations. In order to double that $34,000 during the rest of the year, he would have to produce over $14,000,000 worth of aircraft parts. Another company started on $1,000. They now employ 140 people and have a backlog of $300,000. But they owe their bank $30,000 for payroll, etc., and their exemption is $10,080 a year.

If such a company makes $200,000 which is considered excess profits, most of this $200,000 is in his shop in inventory, equipment, tools, and other assets. How can he possibly pay the $180,000 Excess Profits Tax in cash—which will be expected?

I am afraid we have gotten into a good many figures, but taxation is one of those subjects hard to describe without giving concrete examples.

All of these things will give you some idea of the problems facing those companies who are endeavoring to do a good job of necessary war production and at the same time build up a reserve of some kind to sustain them in a post-war period. We have been told since childhood that there shall be seven fat years and seven lean years. We dislike to think of the war years as being the fat ones; but it is worse to think of the war years as well as the post-war years as being thin ones, especially when the effect is upon a small useful industry and not upon the long-established, well-capitalized concerns.

All I can say in conclusion is that we hope Congress and the Administration will do more for the small business man than to maintain his constitutional right to lose his shirt.

Six-Month Production Exceeds All of '41

The aircraft industry's warplane production during the first six months of 1942 substantially exceeded the entire 1941 output, according to Col. John H. Jouett, president of the Aeronautical Chamber of Commerce. During the first half of 1942, he said, over two billion dollars worth of planes, engines and propellers were delivered. The entire 1941 output totaled $1,750,000,000.

Texas SAE Hears Colwell

A. T. Colwell of Cleveland, past president of the Society of Automobile Engineers, and vice president of the Thompson Products Company, told the Texas aeronautical group of the Society at a meeting in Dallas on August 26 that the United States steadily is extending its superiority over Axis aircraft. About 200 Texas members and prospective members, including students from Texas A. & M. and the University of Texas, attended the meeting, presided over by Allen Guiberson, chairman. George E. Haddaway, publisher of SOUTHERN FLIGHT, introduced Colwell.

Air Cargo Before SAE

An air cargo engineering meeting will be sponsored by the Society of Automotive Engineers December 8-9 in Chicago with chief interest devoted to problems attendant to large-scale development of wartime transport and peacetime air express and freight. Up for discussion will be future design, gliders, airport facilities and personnel for air cargo.

U. S. to Find, Train Air Cargo Personnel

The newly-created Air Transport Manpower Committee, in co-operation with the Office of Defense Transportation, has mapped plans for providing trained men and women to handle the rapidly expanding plane cargo service. After a conference, the committee concluded that (1) requirements of air cargo service are growing so rapidly that existing workers competent for such service, already on the payrolls of the scheduled airlines, soon will be wholly inadequate; (2) steps should be taken at once to begin the training of future personnel under auspices of the government; (3) women comprise one of the greatest reservoirs for personnel.

First step in the program will be taken through the Air Transport Association, with the airlines specifying in detail the types of jobs for which recruits must be found and trained, and the requirements demanded of applicants.

Members of the Air Transport Manpower Committee attending the first conference were Colonel Edgar S. Gorrell, president of ATA; Samuel J. Solomon, president of Northeast Airlines and director of the air transport industry's training program; and Robert M. McGraith, director of personnel relations for the ATA.

McDonnell to Build Boeing Crew Trainers

The McDonnell Aircraft Corporation of St. Louis, Missouri, has announced it will build Boeing AT-15 bomber crew trainers under license of Boeing. The twin-engined trainer is constructed of steel tube with wood-faired, fabric-covered fuselage and plywood-covered wings and tail surfaces.

New Firm Gets Navy Plane, Glider Order

Navy contracts for plywood planes and gliders and plywood parts have been awarded to the American Aviation Corporation, a new firm recently incorporated in Delaware with offices at 420 Lexington Avenue, N. Y., and a plant site in New York state. R. N. Webster, president of Standard Aircraft Products, Inc., of Dayton, Ohio, is president and board chairman, and Keith Rider, former vice president and chief engineer of Doak Aircraft Corporation of Inglewood, California, is vice president.

Douglas' Oklahoma Factory Completed

The Douglas Aircraft Company's new Oklahoma factory was formally accepted by Donald W. Douglas, president, from U. S. Army engineers on August 15 with its production lines already in operation. The air-conditioned structure is one of the largest in the country, nearly a mile in length, and will turn out four-engined B-24 bombers and Douglas dive bombers.

PBY's Win Praise as Torpedo, Dive Bombers

Rear Admiral J. H. Towers, chief of the Navy's Bureau of Aeronautics, has praised the Consolidated Aircraft Corporation for the accomplishments of PBY's against the Japs. He said they have been used as dive bombers against Jap facilities at Kiska in the Aleutians and as torpedo bombers against Jap ships in the battle of Midway. The Catalinas, normally used as scouts in good and bad weather, often return safely with hundreds of shell holes from anti-aircraft fire.

Continental Moves Into Texas Factory

Continental Motors Corporation has begun production of parts and soon will be turning out complete Wright air-cooled engines at a large plant at Garland, Texas, relinquished on September 1 by the Guiberson Diesel Engine Company to permit greater production of gasoline tank motors for the Army. Jack Reese, president of Continental, said most of the plant's key personnel and workers had been retained. Guiberson Diesel engines and parts will continue in production in Illinois, Allen Guiberson, executive vice president of Guiberson, said.

Continental is now making Pratt & Whitney and Wright engines, in addition to its own types including a new and secret liquid-cooled motor in the 2,000-h.p. class. The Texas plant is the fourth in the Continental set-up and Continental is assisting production at two major engine plants "on the outside."

Reese announced Continental had elected two new vice presidents to assist Ben F. Tobin, executive vice president, in operating the Texas division. They are William Crawford, former Guiberson personnel director, who will serve as assistant secretary and executive officer, and John M. Nixon, former Guiberson production manager, who will be factory manager. Employment at the plant will be tripled, Reese said, and contemplated expansion with extensive retooling, will make the factory one of the most modernly-equipped in the industry.

WRIGHT AIR-COOLED ENGINES for tanks will soon come off the lines of the Texas plant of Continental Motors Corporation. Above, President Jack Reese goes over details with John M. Nixon, a new vice president and factory manager; Bill Crawford, another new vice president and assistant secretary; Executive Vice President Ben F. Tobin, and Claude H. Ames, assistant treasurer.

FOUR KEY MEN of Globe Aircraft Company's staff at Fort Worth are Marvin Marco (top left), personnel director; B. F. Butts (top right), production manager; J. M. Luther (lower left), assistant chief engineer, and William D. White, plant engineer. Marco and Butts previously were with Consolidated at Fort Worth, while Luther came from Curtiss-Wright at Buffalo, N. Y., and White from Southern Aircraft at Garland, Texas.

Deliveries Under Way on Brewster "Blasters"

Brewster "Blasters," the world's latest vertical dive bombers, are being delivered in increasing numbers to United Nations fronts. C. A. Van Dusen, president of the Brewster Aeronautical Corporation, would reveal no details but said production "exceeds our proposed schedules."

"Blasters" are mid-wing, two-seat monoplanes powered by Wright radial engines. Tests have shown them highly maneuverable, capable of long-range operations carrying extremely heavy bomb loads and equipped with heavy armament and firing power.

Brewster is rushing dive bomber deliveries to enter production on an "enormous" fighter program under a large Navy contract. The new fighter will be called the "Battler."

Brewster models are going to U. S., British and Netherlands units.

United Aircraft Earnings

United Aircraft Corporation has reported shipments for the six months ended June 30, 1942, amounted to $242,708,318.07. Net profit for the same period was $6,954,988.02, or $2.37 per share of common stock after provision for dividends on preferred stock.

The corporation estimated its total over-all taxes for the period would amount to $30,337,000, pending determination of tax rates applicable to 1942 operations under the pending revenue act of Congress.

Unfilled orders at June 30 totaled $914,191,113.12.

Aviation Corporation

Consolidated net profit of the Aviation Corporation for the six months ended May 31, after all charges and estimated Federal taxes, was calculated at $2,478,291, which includes substantial income from dividends and profit on sale of securities. Net profit for the first half of 1941 was $662,234. Federal taxes were estimated at $3,100,000, compared with $273,979 for the like 1941 period.

Martin Factory Sets Auto-Ride Record with Unique Traffic Control

Last October each automobile transporting workers to and from the Glenn L. Martin Company's Baltimore plant carried 2.6 passengers. Today each car carries 4.5 passengers—an unusual accomplishment in auto utilization.

Behind the Martin record is the planning of Daniel W. Siemon, head of the personnel department. He began by setting up a central registration station, naming all personnel contact men as substation representatives to feed the central register complete information. Each employe with a car listed it and its idle carrying capacity. Those needing rides were listed. When the master list was finished at central station, each contact man set up a supplementary file at his substation.

Every two weeks these files are checked and revised. A vital supplement to them is a gigantic map of the local area, cut up into square miles and showing available autos and potential passengers at a glance. Traffic is channelized and directed into rotary one-way movements, abolishing all opposite-direction friction and cross-friction. Highly-trained guards direct traffic and parking within the plant area, scheduling working hours so that they handle thirty-eight groups—nineteen arriving and nineteen departing every twenty-four hours. Pedestrian accidents have been entirely eliminated. Vehicle accidents have been cut 60 per cent.

Cessna's Inspection Cited

Class "A" approval of the Army Air Forces for quality control exercised by its inspection department has been won by the Cessna Aircraft Company of Wichita, Kansas. Only a skeleton force of Air Force inspectors will be maintained at the plant for occasional spot checks and to approve finished planes.

New Aviation Corp. Unit

Plans have been announced by the Aviation Corporation for a new manufacturing unit, to be known as Northern Aircraft Products division. A plant will be built in Ohio for the production of aircraft parts. Details were not given.

Minta Martin Lab. in Use

The first use of The Minta Martin Aeronautical Laboratory for research has been made by the U. S. Weather Bureau. Major Lester D. Gardner, executive vice president of the Institute of the Aeronautical Sciences, announced that an important research project had been transferred from Washington to Daniel Guggenheim Park, Port Washington, Long Island.

Four AWA Governors Named

President Cub Taylor of the Aviation Writers Association has named four regional governors of the Association. Four more remain to be named. Those announced are:

For Washington, Oregon, Montana, Idaho, Wyoming and Northern California—Larry Gilbertson, Portland, Ore.

For Southern California, Nevada, Utah and Arizona—T. Benson Hoy, Los Angeles.

For Tennessee, Alabama, Georgia, South Carolina and Florida—Donn Hale Munson, West Palm Beach, Fla.

For the District of Columbia, Maryland, Delaware, Virginia, West Virginia and North Carolina—Wayne W. Parrish, Washington, D. C.

For Maine, Vermont, Massachusetts, Connecticut, Rhode Island and New Hampshire—George E. Pelletier, Providence, R. I.

For Minnesota, Iowa, Wisconsin and Illinois—Harry Spurrier, Joliet, Illinois.

President Taylor has named a membership committee of Devon Francis, New York, chairman; Charles F. McReynolds, captain, Army Air Forces, Twenty-Nine Palms, Calif., and Wayne Thomis, Chicago.

Braniff Trains AAF Mechanics as Maintenance Specialists

In co-operation with the Army Air Forces Technical Training Command, which is charged with supplying increasing thousands of highly-trained men for the rapidly-expanding Air Forces, Braniff Airways has inaugurated training in aircraft maintenance for a large number of graduate Army mechanics at this Braniff base in Dallas. Designed to give the trainees specialist training, the course was set up by R. W. Logan, Braniff's superintendent of training, and his assistant, R. L. Dumas. Trainees work alongside veteran airline mechanics and learn the company's meticulous methods of maintenance. After completing the course at Braniff, the soldiers are qualified as specialists in their particular fields of mechanics. Braniff is one of several of the airlines to perform this service for the Air Forces, said T. E. Braniff, president.

CHARLES JOHNSON (left), Braniff maintenance superintendent, and Assistant Training Chief R. L. Dumas welcome Capt. Oscar H. Kraft, who led a group of AAF mechanics to the Braniff base for training.

J. N. Ray (left) points out motor cowling work to soldier. Soldiers (center) like Braniff's air-conditioned lab. Magnet test (right) is shown by L. E. Dease, Braniff expert.

Cleveland Pneumatic Executives Write Text on Aircraft Riveting

"Aircraft Riveting" is the title of a new book written by James E. Dillon, assistant advertising manager and public relations representative of the Cleveland Pneumatic Tool Co., and Earl B. Lear, design engineer for the same company's wholly-owned subsidiary, the Cleveland Rock Drill Co.

This 118-page illustrated text is published by the Pitman Publishing Corp. of N. Y. Covering the subject concisely, in an easy-to-read manner, it includes a description of types and construction of rivets, riveting and pre-riveting tools, strength analysis of riveted joints, riveting methods, terminology, and a list of "don'ts" for riveters. Specifications for rivets and tools are also included, and the book is replete with clearly drawn illustrations.

Already this book has been acclaimed as "one book that every riveter, stock clerk, purchasing agent, and executive should own."

How to Obtain WPB Production Services

A survey by the Office of War Information shows that almost 400 plants in the country still have not reported to the War Production Drive headquarters, War Production Board, Washington, D. C., and consequently are not receiving tested plans and materials for increasing production. Labor-management committees in war plants are urged to take advantage of the varied services of the WPB and should obtain this service immediately by writing to the WPB. They can obtain current posters, big streamers, motion pictures, transcriptions, bulletin board placards, a variety of stickers, material for plant newspapers, information bulletins, awards for production accomplishments, and booklets of helpful suggestions on plant needs. The WPB also will provide speakers, circulating exhibits, performance communiques and other features to stimulate production.

"Skin Heater" Solves Wing Buckles, Wrinkles

A new "heat therapy" process, developed by Harry F. Kniesche, assistant factory manager of the Glenn L. Martin Company, has solved the difficulty of riveting wrinkled and buckled wing skins. It greatly simplifies and speeds the wing-covering operation. Here's how it works:

The various sheets of aluminum that make up a skin are riveted together on a wood frame that has the shape of the wing. The skin, full now of unavoidable small buckles and wrinkles, is then laid on the wing of the ship. The skin heater, which might be described as an oversized version of the electric heating pad people apply to a sore back, is laid on top of the skin. The heater fits snugly, for it has the exact contour of the wing.

The heat is turned on. In a few minutes the skin has a temperature of 140 degrees, which causes enough expansion to rid it of all wrinkles and buckles. While rheostats hold the temperature constant, the skin is quickly stitch-riveted around the edges and along the ribs. Then the heater is removed and the skin shrinks as taut and unwrinkled as a drum-head.

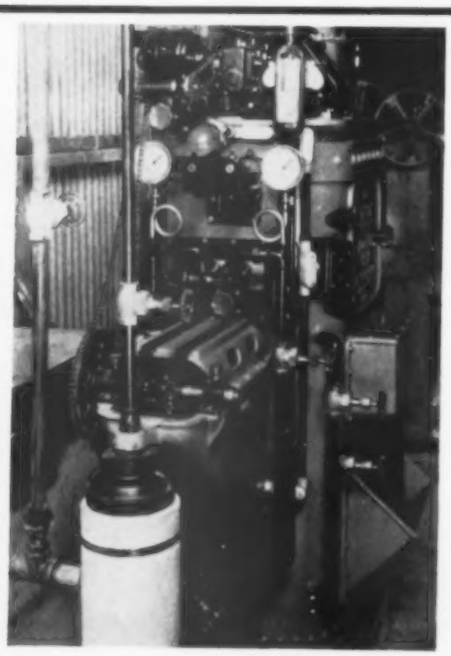
NAA Adds Women

Female workers at the Texas plant of North American Aviation, Inc., have greatly increased in number, amounting on September 1, to about 20 per cent of the personnel.

PROGRESSIVE WELDER Company developed this welding gun for spot welding of light gauge alloy steels, where low pressure is required in order not to deform the work.

Fairchild Agency Named

Joseph E. Lowes, Jr., director of advertising of the Fairchild Engine & Airplane Corporation, has announced appointment of Cecil & Presbrey, Inc., as advertising counsel. James M. Cecil, agency head, and John P. Kane, who will be the Fairchild account executive, were both World War I pilots. L. F. Triggs, who will handle the copy department, formerly was identified with the advertising of American Airlines, Inc., and Vultee Aircraft, Inc.



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Left: Untouched photo showing one of the intricate automatic "TRU-VIX" File resharpening machines. No acid is used. Dull teeth are mechanically sharpened.

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NEW LITERATURE

Plastics

Complete information covering plant facilities and production of extruded industrial plastics is contained in a booklet issued by the R. D. Werner Company, Inc., 380 Second Avenue, New York, N. Y., manufacturers of extruded plastics. The free booklet contains a chart of general properties of plastics, lists minimum and maximum shapes together with their pertinent data, and details scores of applications in war work.

Welding

The seventh edition of the "Procedure Handbook of Arc Welding Design and Practice," of 1,308 pages with 1,810 illustrations, has been published by the Lincoln Electric Company, Cleveland, Ohio. Authors of the book have made every effort to help men in the shops, shipyards, airplane factories, ordnance plants and arsenals produce to the fullest extent. Cost is $1.50 postpaid in the U. S., $2 elsewhere.

Plastics

Inquiries have led the Elmer E. Mills Corporation, 812 West Van Buren Street, Chicago, Illinois, to make available to those desiring details and technical information, a free catalog containing complete data on the properties of Mills Plastic Tubing and Fittings.

Lathes

A new manual, "The Care and Operation of a Lathe," has been published by the Sheldon Machine Co., Inc., of Chicago, Illinois, builders of Sheldon Lathes. Price for single copies is 50 cents, with discounts for schools or other quantity buyers.

Metal

Ampco Metal, Inc., 1745 South 38th Street, Milwaukee, Wisconsin, will furnish interested engineers on request two new bulletins. One, "How Aircraft Designing Engineers Use Ampco Metal," describes pictorially the use of the product by the aircraft industry. The other, a supplement to the Ampco-Trode Weldrod Bulletin, describes in detail Ampco-Trode 10, an all-purpose, coated bronze electrode.

Accessories

The machinery products division of the Ideal Commutator Dresser Co., 1278 Park Avenue, Sycamore, Illinois, has published an illustrated pamphlet describing its machine tool accessories. Included are Ideal live centers, metal etcher, demagnetizer, grinding wheel dresser, balancing ways, variable speed pulleys, electric marker and portable cleaners.

CALHOUN H. YOUNG, Southern manager of the Belden Manufacturing Company of Chicago, has moved from Atlanta, Georgia, to Dallas. He has been connected with the aircraft, radio and radio instrument business since 1927.

BRIEFS

Merger of Airmax Corporation of San Diego, California, manufacturers of aircraft heating equipment, with Pacific Gas Radiator Company of Huntington Park, California, under the new firm name of PACIFIC-AIRMAX CORPORATIONS has been announced by Helen A. Hartfield, president. R. C. Gross, president of Airmax, is vice president and general manager of the new firm.

Paul Dubosclard announces formation of PARAGON RESEARCH, Inc., 1600 Seneca Street, Buffalo, N. Y., which has taken over all development work of the Farnham Manufacturing Company. The Farnham Company, specializing in engineering and producing machine tools for wing production (spar millers, forming rolls and countersinkers), has two main reasons for divorcing its research department from its manufacturing facilities, Dubosclard said. They are (1) the necessity of utmost secrecy in present-day research, and (2) the necessity for "uninterrupted effort, unaffected by production schedules, building expansions and other handicaps to clear thinking."

The THERMADOR ELECTRICAL MANUFACTURING COMPANY of Los Angeles has purchased the machinery, dies, equipment and inventory of the Inca Manufacturing division at Los Angeles of the Phelps Dodge Copper Products Corporation, according to Harry H. Fogwell, president, and William C. Cranston, vice president, of Thermador.

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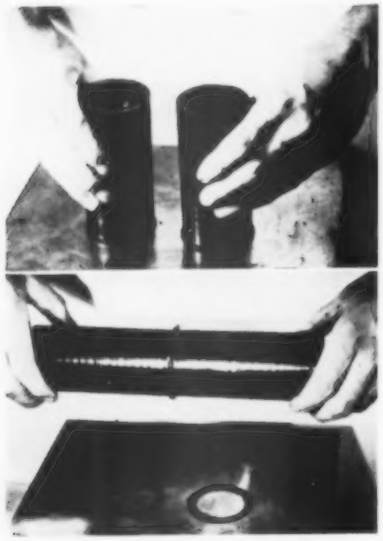
NEW PRODUCTS



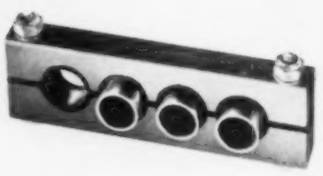
SARAN PIPE, made of a new thermoplastic resin by Dow Chemical Company, can be welded in less than one minute. Pieces (top) are placed on a hot plate heated to 350 to 400 degrees and held until molten material appears. Then (lower) they are pressed together and allowed to cool for ten seconds. The resultant weld has greater joint strength than the pipe itself.

AEROCRAFT JUNIOR angle drill, designed especially for drilling in inaccessible places, is only 5¾ inches long. It is a product of Aircraft Tools, Inc., Los Angeles.

New Plywood Finish

The Zapon division of the Atlas Powder Company has announced a new development in finish for plywood plane and glider production which will release large quantities of critical metals. Used in manufacturing Army planes and gliders, the new finish seals the wood to provide the highest moisture resistance. It is specially designed to add a minimum of excess weight to planes and fits the high speed schedules consistent with rapid production. Wide use of the finish in peacetime is expected.

HARVILL CORP. 3-way plug valves like this are now made almost entirely by the new Harville Pressure Mold Casting process, saving 50 per cent in materials and 83 per cent in machining labor.



ADEL PRECISION Products Corporation, the aircraft industry's principal source for integrally cushioned and bonded line support blocks, announces a "Victory Series" of plastic supports using only one-eighth of the critical synthetic rubber material necessary for previous standard Adel 800-A line supports.

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CASTERS & WHEELS

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PROTECTS THE FILAMENT

By exclusive Littelfuse process (Pat. No. 1,922,642) Littelfuse Caps are so firmly locked **no** vibration — shock — impact — or twist, can separate them from fuse-body.

LITTELFUSE Army Air Corps AC-32271 for general protection in ratings of 20 amperes or less.

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for full details of these and other Littelfuse superiorities for highest efficiency, greatest mechanical strength, resistance to vibration and fatigue.

EXCLUSIVE LITTELFUSE DESIGN

✓1. Locked cap assembly hold cap and fuse securely.
2. Element twisted at 90° braces against severe vibration.
3. "Goose-neck" non-crystallizing fuse element takes up contraction and expansion. Solves heat problem.

LITTELFUSE INC.

First in Aircraft Fuses—Pioneers in the Industry.

4763 Ravenswood Ave., Chicago, Ill.

Forty-four Fairchilds Flown 9,000 Miles to Brazil

Flying in six groups from the Fairchild factory at Hagerstown, Maryland, fifty-eight pilots and mechanics of the Brazilian Air Force recently flew nineteen Fairchild F-24 four-place cabin monoplanes powered by 145-h.p. Warners and twenty-five PT-19 Fairchild trainers powered by 175-h.p. Rangers to Rio de Janeiro, where Fairchild planes are replacing German Focke-Wolff planes in training and transport. The largest flyaway delivery of planes yet made to South America was routed over a 9,000-mile route through Texas, Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, the Guianas and Brazil without incident.

First Scheduled Cargo Service is Certified

Pan American-Grace Airways (Panagra) has announced operation of the first scheduled commercial all-cargo service by international air carrier to be certified by the Civil Aeronautics Board. The service links Balboa, Canal Zone, and Lima, Peru, over a 1,678-mile route. Two Douglas DC-2 airliners, converted for freight only, have averaged about 3,300 pounds per payload.

McDonnell Tests Paper Plastic for Aircraft

A laminated paper plastic experimental wing tip made by the McDonnell Aircraft Company of St. Louis has been given a static load test of 2,800 pounds—140 per cent of the design breaking load of a comparable aluminum structure, the company announced. Under the load the wing tip showed slight failures but was not completely destroyed.

Describing the use of wood-pulp paper in aircraft structures, the company said molding is done at 250 pounds per square inch pressure. The result is a laminated paper "plastic" of strong sheets impregnated with phenol-formaldehyde. "Tests have shown the experimental wing tip to be stronger and lighter than the current production aluminum tip," the company stated.

THIRTY-ONE YEARS AGO Dick Depew and other Cornell Aero Club members built and flew this kite-like glider. Today Dick, executive vice president of Taylorcraft Aviation Corp., is building TG-6 trainer gliders for the Army Air Forces.

New Navy Board Has No Flying Officers

In a reorganization move last month to keep abreast of changes in the science of warfare, the Navy revamped its general board by adding two admirals, naming a new chairman and greatly increasing the board's duties, which include setting policy covering the number, type and design of aircraft. The board is unique: None of its members are airmen. The *Washington Post*, which surveyed the board, also pointed out that less than one-eighth of the staff of the fleet commander-in-chief are airmen.

Arnold Cites the Record

Lt. Gen. Henry H. Arnold, Army Air Forces commanding general, announced in mid-August that 1,010 Army planes have engaged 1,459 Japanese planes so far and have destroyed 190 of the Jap craft while losing 104. His figures did not include Navy or Marine operations, or planes lost or destroyed on the ground, and the covered only verified losses, he said. The figures also omitted the record of Claire Chennault's Flying Tigers, who had shot down 218 Japs, while losing only 84 of their own, before they were disbanded on July 4.

Howard Hughes Teams Up With Henry Kaiser

Awaiting government contracts for 500 seventy-ton cargo planes similar to Glenn Martin's Mars. Henry J. Kaiser, the West Coast shipyard genius, has announced that he and Howard Hughes, designer of the Lockheed Constellation and other sensational planes, has agreed to "go forward together and jointly, on an equal basis."

Guiberson Gives Diesel Aircraft Engine to A. & M.

Students of aeronautical engineering at Texas A. & M. College will be enabled to launch a practical laboratory study of diesel aircraft engines as a result of the presentation of a Guiberson diesel engine to the school. Allen Guiberson, executive vice president of the Guiberson Diesel Engine Company of Texas, made the presentation on September 3 in ceremonies at College Station, Texas. Dr. Howard Barlow is head of the college aeronautical engineering department.

RAF on U. S. Coast Patrol

Units of the British Royal Air Force have joined U. S. Army, Navy and Civil Air Patrol operations against enemy submarines along the Atlantic coast, the Navy has announced. Details were not divulged.

GEORGE W. MASON, president, and W. F. Armstrong, vice president, of Nash-Kelvinator, inspect scale model of Vought-Sikorskys soon to be made in New Orleans as Navy freighters.

CAA Calls for Volunteers

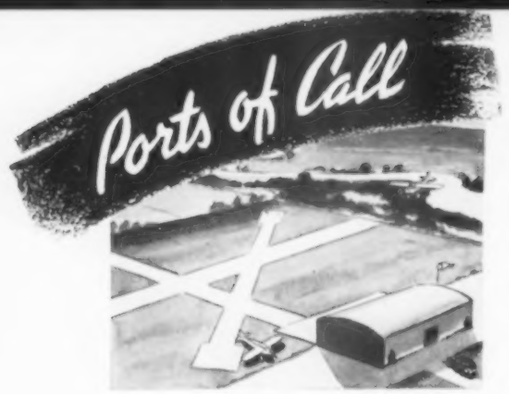
The Civil Aeronautics Administration has called for "thousands" of volunteers to be trained for the Army Air Forces as flight instructors, transport, glider and liaison pilots. Trainees need not meet the stringent physical requirements for combat cadets, and may be from eighteen to thirty-six years of age. They will be enlisted in the Air Forces Reserve, under a program begun July 1, and now entering its second session. The American Legion, with 12,000 posts, is co-operating in the drive.

Both novices and men with some flying experience are wanted, the CAA announced. The latter will enter CAA training at an appropriately advanced stage. Pilots with 150 or more hours can qualify as instructors after a two-month course. Training begins at one of the 600 colleges participating in the CAA program, with room, board and a complete flying course provided by the CAA. After from eight weeks to eight months of CAA instruction, they enter Army flying schools and have the opportunity of qualifying for a commission, or for the rank of staff sergeant with flight pay. Full information may be obtained from colleges participating in the program, American Legion posts, and from the CAA.

Five Air Manuals for High School Students

The Air Training Corps of America has prepared five manuals for school use. They are "The Manual of Instruction," directing the establishment of ATCA units; "The Instructor's Guide Book for Drill and Formation," a treastise on modern marching formations; "Physical Training for Airmen," detailing a new program; "The Manual of Guidance for Young Airmen," designed to help ATCA instructors guide and counsel future aviators, and "The Airman's Manual for Drill and Formation," the student's counterpart of the previously mentioned guide. The ATCA's information division is located at 285 Madison Avenue, New York City.

FLIGHT TESTS are under way on the Funk Aircraft Company's new experimental military glider. It is a conversion of the Model B75L Funk. Details have not been released.



Bryan, Texas

Glider Program Started

Coulter Field—The first student to solo on our new field was Catherine Parker . . . and a very beautiful young lady she is, too. To prove it her photo is promised next month. . . . A girl may also carry off second honors as we are expecting Ruth Gordon to solo any day now—perhaps before this news goes to press.

Students flying at Coulter Field are: W. W. Scott, city manager; Tom Wallace, band director at Allen Academy; Robert Dillard, printer; J. P. Hunter, of McCullough Funeral Parlors; Alan Cornwall, welding instructor at A. & M. College; Ray Hirans, owner of the College Co-op; Mrs. Dell Bauer; Miss Ruth Gordon, and Miss Catherine Parker . . . Jack Pridgen of Houston is taking his instructor's rating here within the next few weeks. . . . Others flying here include: R. L. Felder of Chapel Hill; Giddings Rogers of Navasota; I. M. Shannon of Normangee; Bob Parr of College Station; and Girdner Hendrix, Ed Rogers, Thomas Littlepage, all of A. & M. College.

A Government glider program has been started with twenty students expected.

We hope that everybody who reads this will come to Coulter Field and visit us, for we are proud of the airport the City of Bryan has built, and we want everyone to see it.

NAN BIGGS

Enlist CIVIL AIR PATROL in your

Commerce, Texas

East Texas Flying Service Busy

Eastex Airport—H. H. Womack's East Texas Flying Service is now going full blast in the finishing stages of their primary and secondary courses. They are training Army and Navy students. Primary instructors are: Albert Bourgeois of Shreveport, La.; W. T. "Dub" Waits of Sulphur Springs, Texas; and R. W. Brown of Greenville, Texas. Richard Followill of Rolla, Missouri, is secondary instructor; William Gerbetz of Cleveland, Ohio, does the student checking.

Robert C. Connally of Sulphur Springs, Texas, has just received his instructor's rating and is doing a swell job at Paris, Texas . . . Morris Jacobs of New Orleans, La., is still here keeping 'em flying. The sky is kept full of Aeroncas—a regular merry-go-round.

Enlist CIVIL AIR PATROL in your

Dallas, Texas

Ferrying Command Moves to Love Field

On tour with Tony—Out Hensley way, chatting with Col. Ferguson, Major Hamm, and Capt. Tompkins about when the Command would get their mail at Love Field, it developed that about the fifteenth of the month would see them newly officed. . . . The number of service pilots who have been transferred would be interesting to our Jap spy reader, Fooey Yellomoto, so we can't print it (anyway, they wouldn't tell us) . . . but a lot of constant readers have taken the well known war powder. . . . Hey! we almost forgot . . . address Elmer Lane as "lieutenant" now.

Love Field lost Charlie Hanst to the Army Air Corps. He will be in Miami for a while and then transferred back to Hensley (maybe). . . . Things are certainly changing around these parts . . . saw Elmer Sojka from Stamford, Texas, the other day . . . he was that excited . . . new wife, and a couple of days off from the school. . . . The Lockheed men of the air—Pete Cavender, Curry Sanders, Ben Bransom, and Fred Dick—are seen often enough to keep up interest in what's cookin'!

Hudson Field—Not bragging, but "Kelly" Omdalan has soloed seventy-five students in the last six months . . . and yelled for help . . . so C. N. Mood came out and offered his instructor's ticket and self to the flying staff. A nice bit of addition . . . Doctor Nesbitt's little daughter, Susan, a novice pilot, is a 1-A prospect for a private license within six months, so goes the gossip.

Corpus Christi lost a pretty titian blonde, and the CAP gained another private pilot when Janice Tate came to that little city next to Cowtown. . . . Prospect Department: Thomas Guthrie and J. D. Fulwiler will be in the market for a pair of flying machines A. W.* (*after the war). . . . They are hot after private licenses so CAP will gain a couple more hunters.

One Sunday when the thermometer was a shade under 106, Marion Guiberson, the Harry A. Sheridans and the Wm. E. Linds, all of the Diesel brand, were sitting in said shade enjoying the cool of the day. Bill Lind, Jr., was expected any minute from his fourth lesson. He made a good approach, landed, and climbed out of his blue chaser to announce that he wanted to fly a YP38. He will tip the scales at about fourteen years, but Lockheed had better get the application ready . . . that boy means business.

Kenneth Burke told us that the soft drinks were cold . . . he'll never be a parson, but the coke house still has nice music at five cents per . . . and it was told that Allen Guiberson is taking more time to become active at the controls of a ship again. Mr. R. N. Smith allowed that friend Clampett is out in the orange state, to be home soon. . . . Eva James is shooting landings like a veteran . . . and it is rumored that five will get you ten any day you want to bet that student pilots are on the increase at Hudson.

Lou Foote Airport—If you haven't flown toward Waco lately, you have missed seeing one of the prettiest new flying operations in Dallas. Just nine miles south on Beckley Drive, you will find Jean and Lou Foote's new deal. They came to an agreement with the Navy on the Grand Prairie field, so they moved their complete flight operations to the new buildings, hangars and smooth runways out yonder way. Son Jack is an instructor, and they have lots of private and student pilots who drive out and get a half hour's time after work.

The Army and Navy CPT programs are run off like clock work. In the first batch of Navy flyers, Bernard Sampson and Bynum E. Murphy wound up as junior grade lieutenants, and Thomas Hancock, Frank Lanham, John Earl Sunderson, and Francis W. Rankin will get their mail addressed "Ensign" from now on. Six of a kind, all Texans.

There is an open invitation to everybody to hop over and have a softy in the coffee department and to have a "look see" . . . it's a mighty fine field.

TONY HAGMANN

Enlist CIVIL AIR PATROL in your

Fort Worth, Texas

Local Correspondent Married

Miss Margaret Ewing, "Ports of Call" correspondent at Fort Worth for a number of years, was married on August 2nd to Corporal Arnold H. Bowman. The ceremony was performed at the First Methodist Church, Fort Worth.

SOUTHERN FLIGHT extends best wishes to the newlyweds, and is happy to announce that Mrs. Bowman will continue to report Fort Worth Aviation news.

START FLYING . . . . . NOW
It's Patriotic!
It's Fun!
AMERICA'S LEADING
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SUBSTANTIAL - - EXPERIENCED
Retaining Our Leadership by Prompt, Efficient, Courteous Service.
Buy the Easy Way—the A.C.C. Way. A Specialized Service to the
Aircraft Industry. Contracts Insured and Purchased Immediately.
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AVIATION · CREDIT · CORPORATION
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Just as MAGNAGLO took the guesswork out of steel parts, ZYGLO now takes the guesswork out of all non-magnetic parts.

To maintain our reputation for having the newest, most complete repair station in the Southwest, we have added the latest ZYGLO process to check for possible defects in such vital parts as alloy crank cases, connecting rods, pistons and impellers.

When you bring your plane to us, you will get this absolute check on all non-ferrous metal parts, assuring perfect service that meets Aircraft Sales Co. high standards.

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Ten minutes from downtown Dallas

PARA-PACK
Complete Parachute Service
Student Instruction
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1st Hangar So. of Adm. Bldg.
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QUALIFICATIONS FOR THE FERRYING COMMAND

You must be an American citizen between the ages of nineteen and forty-five years with not less than three years of high school.

You must have 200 hours flying as pilot of heavier-than-air aircraft as follows: 100 hours solo; 100 hours must have been in aircraft with engines of 125 or more horsepower—at least 25 hours of which were flown alone; and 50 hours must have been within twelve months preceding date of flight test.

You must have: CAA "Commercial" license (validated); three letters of recommendation; written release from employer (if previously employed by defense agency, U. S. Government, Canadian Government, or prime contractor thereof).

You must be able to pass flight test as given at this station.

Released by

CAPT. J. D. TOMPKINS,
Air Corps Personnel Officer
Hensley Field, Grand Prairie, Texas

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FLYING SERVICE
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AIRPORT
The Newest Dallas Field
Phone W-1131
9 Miles South on Beckley

Fort Worth, Texas

Parachute Packing Station Now at Meacham

On tour with Tony—Tom A. Herbert, the Chief of Protection at Globe Aircraft, with the difference on his hip, is also an eight goal man at polo, undefeated champion boxer and wrestler of the Army, Navy and Marines of the Panama Zone. . . . in short, a man who can really handle his deal. This bit of information came direct from his lieutenant, Oscar Nowlin. These men check the credentials of any citizen who has, or thinks he has, any business with the head-ups. Lois June Neely okays the card they give you, making you a good Globe visitor. Lois was an "A" Liner hostess until a bright young man asked her the good ole question. (Mrs. Neely, now) . . . P. S. It is *not* true that Globe is making four-engine bombers.

New business of the month is the silk safety shop. It is for double sure that you will have your parachute repacked every sixty days, and it's a seven-to-one shot that Helen Quinlan is interested in having you bring it to her. Helen has opened a new "Parapack" shop all her own in the interest of legal silk business. She may be found in Roy Taylor's hangar — the rent's all paid for the space it takes to dry, repack and check your droppers.

Giving the coffee and cakes department the business on a day in August were Roy Taylor, Gene Royer with his new man in the field, E. A. Russel, W. M. (Mac) MacDonald, Inspector Ravenstein, Lt. Scott, Capt. White, Fred Easley, Charlie Scholes, Mrs. Ritchie, and Les Bowman. It was not CAVU, so they were sitting around bragging on the number of CPT students they have in the walking army . . . and it is a plenty. 'Bye now . . .

TONY HAGMANN

Outstanding New Aviation Defense Books

COMMERCIAL and PRIVATE PILOTS: New "Aeronautical Training" fully covers new multiple choice examinations, with drift off course and alternate airport problems plotted and solution given. Commercial examinations are shown in separate section of the book. Navigation, Meteorology, Aircraft, Engines and CAR covered. Just published—12th edition only $3.00 postpaid, or C.O.D.

RADIO and INSTRUMENT FLYING: by Charles A. Zweng, Instructor, U. S. Air Corps. New 1941 Edition covering new important material. Written especially to prepare the pilot for government examination for "instrument rating." Radio-Telephone Permit included with Meteorology, Radio-Orientation, let-down, offcourse and alternate airport problems. Only $4.00, postpaid.

A. & E. MECHANICS RATING: Airplane and Engine Mechanics—Can you pass your written test? Send for new quiz book covering Airplanes, Engines, and Mechanics' Civil Air Regulations. 156 pages, fully illustrated, with new multiple choice examination questions. Only $3.00, postpaid or C.O.D.

FLIGHT INSTRUCTOR: A new quiz text covering the scope of the new multiple choice examination for flight instructor rating. Illustrated with diagrams. $3.00, postpaid, or C.O.D.

GROUND INSTRUCTOR: Written for the student preparing for "Ground Instructor Rating." Excellent for class work. Covers Navigation, Meteorology, Aircraft and Theory of Flight, Engines and Civil Air Regulations. $3.00 postpaid or C.O.D.

GROUND INSTRUCTOR RATING: Contains "Multiple Choice" examinations on Navigation, Meteorology, Aircraft and Theory of Flight, Engines and CAR. Nomenclature and aviation dictionary in back of book. It's new and different. Something you cannot afford to be without. $3.00 postpaid. Or it may be purchased in combination with "Ground Instructor" for $5.00.

NAVIGATION PLOTTER: (Dept. of Commerce type) is necessary for all problems involving drift, letdown and offcourse, including alternate airport problems. May be used when taking examination. Complete with large leatherette Navigation Note Book and instructions, only $4.00 postpaid.

AIR NAVIGATION (Gold Medal Edition) includes meteorology, $5.00 postpaid.

METEOROLOGY: New edition for pilots by Lieut. Commander Halpine. $2.75 postpaid or C. O. D.

SIMPLIFIED CELESTIAL NAVIGATION by P. V. H. Weems and E. A. Link, Jr. $3.00 postpaid.

U. S. COAST AND GEODETIC (Lyon) AIRCRAFT COMPUTER with book of instructions. $3.00.

Pan American Navigation Service

12021 Ventura Blvd., North Hollywood, Calif.

Kansas City, Missouri

Captain Wright Now Commanding Officer

CAP—The Maryville squadron of the Civil Air Patrol was hostess to the Kansas City chapter of the Ninety-nines when they literally flew to their breakfast in seven airplanes.

Schools—Capt. Ira L. Wright is now commanding officer of the training detachment at the Missouri Aviation Institute on the Municipal airport, with Major Henry R. Iker, the former commanding officer, now in charge of the area headquarters of the technical training command, with offices in the uptown building of the Missouri Aviation Institute. This new setup brings the National School of Aeronautics, the school operated by Transcontinental & Western Air, Inc., as well as the Missouri Aviation Institute, under the supervision of Major Iker and his staff.

WNAA—Recently two members of the Kansas City Unit of the WNAA were made Assistant Secretaries of their respective aeronautical companies—Miss Martha Knecht of Mid-Continent Airlines, Inc., and Miss Marion Melcher of Missouri Aviation Corporation. . . . Mr. W. T. Brown, manager of the Municipal Airport, was guest speaker at the Unit's regular monthly meeting on August 12th, reviewing Victory Though Air Power by Major deSeversky. . . . In September the WNAA is to join the Chamber of Commerce, the Advertising Club and the NAA in a luncheon meeting at which Mr. Wayne Parrish, editor of AMERICAN AVIATION will address the assembly. . . . Mrs. Frederick G. Wirthman was appointed WNAA Governor of Missouri for a second term. Miss Frances Kypke, secretary of the Unit, was made National Chairman of the Resolutions Committee.

MARION MELCHER

Attention!

SOUTHERN FLIGHT ADVERTISERS

The War Production Board has ordered that all advertising plates not used for one year must be salvaged as a conservation measure in our war effort. Only plates having an assured future use are excluded.

Please help us comply with this order by advising us which of **Your** cuts, if any, should be held for future use. Should you wish any plates returned, they will be sent, transportation charges collect, on request.

Plates not definitely ordered held or returned will be disposed of for salvage before October 1st as directed by the War Production Board.

Your prompt co-operation will be sincerely appreciated.

SOUTHERN FLIGHT

Shreveport, Louisiana

State Poet Laureate Named

Claude Hamel, John Peyton, and F. A. Fuller have gone to see some members of the CAP in other places. Local classes continue, although drilling in the summer heat has its drawbacks. . . . Louise and Art Hall enjoyed a fishing trip at Grand Isle. . . Dorothy LaFitte vacationed at Hot Springs. . . . The local squadron received a very nice write-up in a recent Sunday edition of the Shreveport Times.

Centenary College recently started a CPT course for future flying officers for the Navy. Those now finishing the course include: Ernest Shaw, Leland Robertson, Collie Rutledge, Ollie Jones, Clyde Henderson, E. C. Talbert, Claude Petry, G. G. Gauthier, Raymond Jolly, Gilbert Tierce, Henry Woling, all of Shreveport; and Walter Colgin and Butler Avery, of New Orleans.

Marvin Carney, also instructor for Badgett, is the proud papa of a baby boy. . . . Mrs. Emma Wilson Emery, Bob's mother, has been named poet laureate for the state of Louisiana. . . . Wonder how Joe Messina likes the new house he bought?

MARJORIE HARDMAN

Tulsa, Oklahoma

Glider Course Started

Lots going on around Harvey Young's airport these days. The twenty new faces you see around the field are probably the boys who have signed up for the glider course.

They had quite a race trying to see who could solo first, but leave it to Ray Testerman . . . he "dood it." So far, Ed Kunke has had the most exciting solo, at least for his instructor, Harry Williams. He only ran Harry off the field on his first landing.

Latest attraction around the port is "Dot" Lemon, who has been added to the staff of TAS instructors. Dot has around 2,500 flying hours and about sixteen years of airport ownership and flight training experience. Also, she was first chairman of the Ninety-Nines. Holder of several ground school ratings, she came to Tulsa last spring to enroll in the instrument and link training course at Spartan School of Aeronautics. Incidentally,

(Continued on page 57)

FOR SALE: TIRES WHOLESALE. New factory stocks. Our Specials: 6.00 x 6 non-skid 7.00 x 4. 8.00 x 4 smooth 2-ply $8.75. 4-ply $10.75. Tubes $3.25. Large stock 6.50 x 10, 7.50 x 10, 8.50 x 10, Culver 5.00 x 4, new production 4-6 ply. 8"-10" and all sizes tail wheel tires. New Goodrich 6 x 2 solids $1.65. Big stock tires and propellers for rush delivery in any size, supplying many the largest operators at lowest prices. Shipment C. O. D. Inspection allowed, guaranteed merchandise.

SPARK PLUGS FOR SALE: Correct specifications for your engine. New Standard brands. B. G., Champion, A. C. in stock. Immediate delivery. Reading Aircraft batteries, one or quantity. Operators' discounts.

BOB TRADER AERO SUPPLY, Municipal Airport, Pittsburgh, Penna.

—George Marshall Photo.

Cavender Bransom Sanders Dick

FOUR SOUTHERNERS COME HOME TO ROOST

By TONY HAGMANN

La Pierre ("Pete") Cavender, in charge of flight, Fred Dick, Ben Bransom, and Curry Sanders, Southern pilots who have flown since the year one, have come home to roost at Lockheed's Dallas branch. They have barnstormed from all the best cotton patches, county and state fairs, eaten hamburgers at every corner beanery, patched wings, flown during Hoover days, and are at last back where hominy, grits and eggs are on the same platter, flying the planes that every little boy in the country can call by the Army name.

"Pete" Cavender first saw light of day in Houston, Texas. From then on he interested himself in air power. For a good twenty years you could find him at any fair or any place where people wanted to find out how it felt "up in one of them things." After a couple of years as an airline pilot for American he found a spot in Houston and opened up the Main Street Airport. Instruction, ground school, charter service, the works. He sold out in the year 1937 and joined up with Lockheed as test pilot. They have been signing his pay checks ever since. As chief test pilot for the Dallas Branch, he hopes he is home for the duration, but is always on call for anything interesting the factory may have to offer.

Back in 1914, Curry Sanders built a monoplane at Shreveport and it got into the air on several occasions. He abandoned building for flying in 1917 when he was first cadet at Kell Field, Wichita Falls, Texas. Curry got his commission in 1918 and was gypped out of foreign service three different times. Twice his baggage made it, but that was the best he could do. The Army found Curry was an Ace teacher of aerial gunnery and put him to work from coast to coast. After the war, the usual course . . . barnstorming, instruction, crop dusting, owned his own field and made South American under the banner of Huff Doland Co. of Monroe, La. (new Delta Airlines). Curry can get gas in four languages, and Spanish is just kid's play. He joined Lockheed when they had six pilots total. He set up the flight organization, has been all over this country for them and is on tap for anything new.

Another of this quartet is Ben Bransom. Ben was born in Johnson County, not too many years ago. In 1923 the air bug bit him and from then on he has been trying to cure his aviationitis. The cure? Fourteen solid years of flying. Barnstorming the nation, private pilot to several well-known oil men, and doctors. When Dr. J. H. Massie acquired the ambulance plane of Dr. Brinkley, Ben Bransom flew it for him. He flew the tri-motored Ford for Jack Burris and the Beechcraft got the same gentle treatment on hops over the nation. Ben's pet hate is the "pop-pilot," one who has done everything, seen everything, been everywhere with a cool hundred hours. He likes to fly anything Lockheed makes "because they fly so slow and it takes such a long time to get anyplace." That is pure propaganda.

One of Pete's co-working pilots is Fred Dick. Fred operated an airport in Shreveport, Louisiana, for twelve years, "doing handsprings for hamburgers." He has traded time for tires, (happy days) a ride for a meal, a lesson for board, and has helped to train many of our pilots now in foreign service. Fred learned to fly at the Hancock Foundation, Santa Maria, Calif., and back to Shreveport to open his field. Before joining Lockheed, he flew for Delta Airlines, was with CAA, Airways Traffic Control, and American Airlines when American was just a baby. Freddy is going into farming when this fracas is over and he knows absolutely nothing about it. He will take a ground course, solo and get commercial from some cow college, "because farming will be a new field. Everybody else will be up in the air."

These four airmen of the airways are doing an important job for a company long admired by the wealthy market of private owners in this rich territory, and they are plenty welcome home.

Tulsa, Oklahoma

(Continued from page 56)

Mrs. Lemon is most favorably mentioned in Charles Planok's recently published "Women With Wings".

It is now Mrs. William H. Stephens instead of Mary Ellen Holt. The newlyweds tried their best to keep it a secret, but no go. Mary Ellen is secretary to Bill Green, and, like her husband, Captain Stephens of Spartan School, flies and sails a boat.

Latest soloes in the Tulsa Women's Air Corps are Mrs. W. E. Brown and Mrs. Darwin Kirk.

Captain Maxwell W. Balfour has a lot of faith in the ladies. He has just made Jewel Stanton, from Kansas City, chief flight commander of the Civil School at Spartan School of Aeronautics. That means she is "boss lady" over ten of the men instructors.

JONNIE LAIRMORE

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Texas Wing Receives Two Gift Airplanes for Coastal Patrol

Two airplanes for Coastal Patrol have been presented to the Texas Wing, commanded by Major D. Harold Byrd, by admirers in Dallas. One, a Stinson Voyager christened "Spirit of Dallas," was purchased with contributions from various civic clubs by a committee headed by Major Bill Collier, who suggested the presentation after hearing Dr. W. Gordon Maddox, Wing medical officer, describe the Wing's activities. The other, a Rearwin Cloudster purchased with funds contributed by workers of the National Housing Company, was christened "National Houser Comet." E. R. Reid and Tom Wright, employes of the company, started the solicitation of funds for it.

Much publicity was given the two plane drives and numerous other cities started similar campaigns for public contributions.

Regional Commands Out

Regional commands within the Civil Air Patrol organization—one for each of the nine Army Corps Areas, have been abolished. Only five of the posts had been filled. Of these, Major George W. Noland of the Southeastern region, Major Robert S. Fobb of New England, and Harry K. Coffey of the West Coast are out on field assignments. Gill Robb Wilson of the Mid-Atlantic area remains as chief consultant.

Arkansas Wing Expanded

The number of active members of the Arkansas Wing has passed the 1,000 mark, according to Wing Commander Rex P. Hayes of Little Rock. The Wing's outstanding activity to date was an elaborate blackout drill on August 26 by the El Dorado squadron, with Capt. Buck Carter, commander of Group 2. Civil defense officers from Fort Worth called the practice "the most successful witnessed yet."

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